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# EXPLORING INSIGHTS

INTO

# VOCATIONAL SKILLS DEVELOPMENT AND INDUSTRIAL TRANSFORMATION IN CAMBODIA

Veung Naron and Ven Seyhah

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# Exploring Insights into Vocational Skills Development and Industrial Transformation in Cambodia

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Phnom Penh, October 2021

Swiss Programme for Research on Global Issues for Development

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## List of abbreviations and acronyms

| | |
|---|---|
| E&E | electrical and electronic |
| ESP | Education Strategic Plan |
| IDP | Industrial Development Policy |
| ILO | International Labour Organisation |
| KIIs | Key informant interviews |
| KIT | Kirirom Institute of Technology |
| MIT | the Massachusetts Institute of Technology |
| MoEYS | the Ministry of Education, Youth and Sport |
| MoLVT | the Ministry of Labour and Vocational Training |
| NEA | the National Employment Agency |
| NEP | the National Employment Policy |
| NIS | the National Institute of Statistics |
| NSDP | the National Strategic Development Plan |
| OECD | the Organisation for Economic Co-operation and Development |
| RGC | the Royal Government of Cambodia |
| SDP | the Swiss funded Skills Development Program |
| SEZs | Special Economic Zones |
| SME | small and medium-sized enterprise |
| T&D | training and development |
| TVET | technical and vocational education and training |
| TVETSDP | Technical and Vocational Education and Training Sector Development Program |

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## Executive summary

Industrial development is central to Cambodia's economic development as it plans to upgrade the country's status to an upper-middle-income country by 2030 and to a high-income country by 2050. Equipping the workforce with the skills and competencies that match industrial needs requires a great deal of continuous efforts and resources. In this regard, this paper aims to look into the linkage between skills and transformation based on employers' perspectives. It explores insights into how companies perceive and use the skills and qualifications of their employees to overcome changes in technology, products and work organisation. These new insights will enable TVET providers, policymakers and other key stakeholders to develop a holistic skills development intervention that is responsive and relevant to the Cambodian labour market. This paper is based on the analysis of data from 36 qualitative interviews with managers and production heads or representatives from 18 companies in the electrical and electronic (E&E), garment and food processing sectors. Nvivo 12 software was employed for coding and thematic analysis of the employers' perceptions of skills and qualifications in relation to job requirements, the relationship between skills and transformation, and human resource strategies to cope with the skills requirements posed by transformation.

### General perceptions on skills and qualifications of the workforce

Most companies experienced skills shortage and recruitment difficulty when it came to high- and mid-level employees. The skilled labour shortage was worse for some companies located in the provinces, compared to those in the vicinity of Phnom Penh. The reported skilled shortage could be due to companies setting high recruitment requirements with specific skills and knowledge for higher positions, while applicants' skills and knowledge were lower than those requirements. For low-skilled positions like general workers or operators, recruitment was usually easier as companies did not require them to have any specific TVET qualifications; also, those low-skilled employees could be trained in-house to operate machines manually. However, when a large number of those workers were needed by many companies at once, labour shortages also prevailed in some cases, especially in the provinces.

The quality and level of education and training were generally low among workers in the selected companies. Moreover, skills training programs were less relevant to the skills needs and requirements of most companies, and not many of those programs were available across the country. For instance, E&E and food processing companies found the available skills training programs unable to match their expectations and requirements in general. While struggling to get enough skilled labour, most companies agreed that having many employees with better education and training could help introduce new products, adapt to technological change and reorganise work systems. Because most companies lacked trust in the quality of education and training, they prioritised practical skills, knowledge and work experience for recruitment or promotion, while in-employment and internal training were widely valued and adopted as a main source of their employees' upskilling and reskilling.

### Transformation and its implications for skills

Major changes in technology, products and work organisation were reported in some companies in the selected sectors and these changes were driven by different internal and external factors, including market factors, increased product quality and quantity, skills and knowledge improvement, and labour and cost reduction. Particularly, those changes in the interviewed companies were believed to be intertwined with their employees' skills, knowledge and experience. However, hiring high- and mid-level employees with the required skills did

not have an impact on many companies changing their production machines or product types. Rather, these changes were introduced and facilitated by the expertise of their parent companies abroad, machine suppliers or main buyers. This might be because the skills, knowledge and experience of their high- and mid-level employees were lower than those of the technicians and experts from their parent companies or machine suppliers. It could also mean that the installation and maintenance of those machines required higher skills and experience, which were not available within the companies or the Cambodian labour market.

The enhanced skills and knowledge of employees were to some extent related to new technology, product types or work organisation introduced in companies. Changes in technology, product types or work arrangements required a certain change in employees' skills and knowledge. Put simply, any employees involved in such changes had to adapt to those changes and improve their skills and knowledge accordingly over the course of those introduced changes. However, the interview data shows that only a few companies in the E&E, garment and food processing sectors clearly indicated an improvement in their employees' skills and knowledge, and that, in the case of improvement, the additional skills or knowledge were acquired through peer learning.

As the changes were introduced, existing employees could also be affected physically or emotionally depending on the magnitude of the changes in terms of reduction in labour and costs for production improvements, employees' increased skills and knowledge, increased workload and job responsibility, and management change. Most garment companies initiated an incentive platform or a reward system that was intriguingly motivational for all operators and employees. This bonus setup could enhance employees' work performance, leading to productivity growth as well as employees' upskilling and reskilling within many companies.

**Strategies for overcoming skills challenges and problems**

For dealing with the skills problems and challenges posed by transformation, companies used different strategies or methods, including outsourcing of technicians and experts, recruitment of new employees, internal promotion, and internal skills training and development. The outsourcing of technicians and experts was commonly found among many companies, as most companies were less likely to rely on their internal technicians, mechanics or engineers for the introduction of those changes, while also avoiding any recruitment of new employees or requirements for new, additional skillsets. Moreover, as the recruitment of new employees with skills and qualifications could be difficult and costly, most companies alternatively promoted their current employees based on work performance, practical skills and work experience in production. Internal promotion was widely used in all the sectors, and especially in the garment sector. Importantly, while internal training and development were heavily employed in all three sectors, formal training was scant and only happened in some large companies, for instance, in the E&E sector. High- and mid-level employees including managers, supervisors and some experienced team leaders who had strong foundational skills, knowledge and experience with production, and who had been with the companies for a long time, transferred their learned skills and knowledge to operators and general workers through peer learning, on-the-job training, work guidance, observation and practice.

**Implications for policy consideration**

Based on the employers' perceptions of and experiences in skills and transformation, this study puts forward the following implications for policy consideration.

*1. Promoting school-industry linkages through ensuring mutual benefits*

Promoting school-industry linkages would help in bridging the skills gap between skills training programs and industrial skills requirements. Such collaborations should be sustained by ensuring mutual understanding and benefits between partners. The models of the Massachusetts Institute of Technology and the local Kirirom Institute of Technology exemplify a strong university-industry collaboration, allowing students to experience the best training programs and benefiting all the parties involved. The government should also initiate, coordinate and finance this collaboration model between TVET and respective industries to meet industrial skills demand. Furthermore, establishing TVET parks and/or training centres in industrial and special economic zones could help maximise the use of training facilities and company trainers through school-industry cooperation, while enhancing and expanding the training activities and services of the existing TVET parks and training centres would help reach out to more companies and beneficiaries. Therefore, cutting-edge technologies and facilities could be shared among companies and TVET schools offering practical skills training.

*2. Increasing employment opportunities*

Increasing employment opportunities could allow senior students and new graduates to learn from, adapt to, and experience real-work problems and workplace learning. This could be done through internships, apprenticeships and probation programs. Internships allow companies to observe whether students have the potential to be employees. An apprenticeship scheme should be mandatory across industries. In Germany, Switzerland, Austria, Hungary and South Korea, apprenticeships allow students to learn practical skills in the workplace, while participating in theoretical training at school. Such models are a win-win contract between schools, students and companies, but they need piloting or testing in Cambodia, where the current education and training system is different from those of the developed countries mentioned. Companies should also recruit employees with TVET skills and qualifications on a probation basis so that they can learn and adapt to the workplace.

*3. Amplifying investments in generic and specific training*

A certain number of supervisors and team leaders should be given more opportunities to have generic and specific skills training leading to certifications or qualifications. Moreover, companies should systematise their in-house training with appropriate and structured training content and levels, and keep records of the names of participants and training courses for further training or potential buyer requirements. Companies could issue certificates of attendance or participation. They should also work with relevant ministries, such as the Ministry of Labour and Vocational Training (MoLVT), and their development partners to develop a comprehensive skills certification/recognition system, allowing workers from industries to have their prior learning recognised. MoLVT and relevant line ministries also need to incentivise companies that have skills training to work in cooperation with TVET schools. Companies should develop an incentive or reward system that motivates workers to participate in skills training and to enhance work performance at all occupational levels. This incentive system should be a strategy to retain and promote employees to a certain level of management, while reducing unintended employee turnover and recruitment costs. Furthermore, equipping the existing and future workforce with fundamental technological skills and competencies is also an important task that companies and TVET schools need to do as Cambodia prepares to embrace the emerging fourth industrial revolution.

# 1. Introduction

Workforce skills and knowledge are important contributors to firm growth and a nation's economic success (Abbas and Foreman-Peck 2008; Benson, Gospel and Zhu 2013), reflecting the fact that human capital and a country's development are inextricably linked. Indeed, skills development is the cornerstone of Cambodia's socioeconomic development and its vision of reaching upper middle-income status by 2030 and high-income status by 2050 (RGC 2015, 2018). However, equipping the workforce with the skills and competencies that industry needs now takes a great deal of continuous effort and massive resources.

Towards attaining its ambitious development goals, the Cambodian government has embarked on several major initiatives to address skills development issues and challenges, as articulated in the Rectangular Strategies, Industrial Development Policy (IDP) 2015–25, National Strategic Development Plan (NSDP) 2019–23, National Employment Policy 2015–25, National Technical and Vocational Education and Training (TVET) Policy 2017–25, and Education Strategic Plan (ESP) 2019–23. To support these initiatives, international development partners have provided financial and technical assistance to the Cambodian government through an array of projects, including the Project for Improving TVET Quality to Meet the Needs of Industries 2015–20 (JICA 2015), the Skills Development Program (Swisscontact 2018), the Strengthening Technical and Vocational Education and Training project (ADB 2016a), the TVET Sector Development Program (TVETSDP) 2016–20 (ADB 2014); the Skills for Competitiveness (S4C) project 2019–2023 (ADB 2019), and the ILO/China Project on Strengthening Skills Development in Cambodia, Laos and Myanmar through South-South and Triangular Cooperation 2020–22 (ILO 2020).

Despite concerted efforts to boost skills development, the education level of the overall population is low at just 4.8 years of formal schooling on average (NIS 2018; UNDP 2018). Moreover, skills shortages and gaps are still a major concern, as evidenced by the many employers reporting difficulties finding suitable candidates for their job vacancies (ADB 2016b; HRINC 2010; NEA 2018). In turn, employers seem to distrust educational and training qualifications, adding to recruitment difficulties. At the same time, most companies tend to hire job candidates with lower levels of education but at low cost in order to fill vacancies or to meet production workloads. Usually, employers' concerns about poor levels of skills and knowledge among the workforce would demand urgent action from the government and key stakeholders to improve and adapt skills development in anticipation of skills needs and to minimise skills gaps.

Several recent studies have focused on labour market demand and supply in Cambodia. The National Employment Agency (NEA), for example, administered the Cambodia Employer Survey 2017 to 605 businesses, chiefly to collect detailed information on labour market demand vis-à-vis skills training supply, but also to learn about skills shortages and skills gaps in Cambodia (NEA 2018). At the macro level, given the persistent skills gaps and mismatches and talent shortages (Khieng, Madhur and Chhem 2015; Madhur 2014) the Asian Development Bank and the International Labour Organisation conducted an employment diagnostic study to examine constraints and opportunities for closing skills gaps and increasing productive employment in Cambodia (ADB and ILO 2015). However, despite the urgency of the matter, research on the linkage between skills and transformation[1] in Cambodia remains scant (Ven and Veung 2020), as does research into employers' perceptions and experience of workforce skills and knowledge, especially in the manufacturing sector.

1 Transformation in this study refers to changes in products, technology, and work organisation for the purpose of improving productivity or fulfilling market demand.

It is timely to ramp up research into the linkage between vocational skills development (VSD) and transformation, particularly from the employer's perspective. To that end, this paper aims to provide insights on how companies perceive and use the skills and qualifications in their workforce to transform or reimagine their operations in terms of technological change, product innovation and work organisation. Building greater understanding of employers' perceptions of workforce skills and knowledge can enable education and training providers, policymakers and other stakeholders to develop a comprehensive skills development policy and deliver interventions that are responsive to labour market needs.

In order to explore and develop a clear understanding of the linkage between VSD and transformation in Cambodia's manufacturing sector, we set three research objectives:

- To investigate companies' perceptions of employees' skills and qualifications vis-à-vis company-specific skills needs and requirements
- To examine how changes in technology, products and work organisation affect skills and vice versa
- To explore how companies deal with their skills needs resulting from changes in technology, products and work organisation.

## 2. Workforce skills development

A skilled workforce that meets the needs of a country's labour market is central to its socioeconomic development (Benson, Gospel and Zhu 2013). Skills development systems therefore need to develop human resources with the right skills and the right competencies at the right time to meet skills demands in the labour market. Moreover, as workplace technologies seem to be progressing faster than ever, preparing young people for the future of work is a socioeconomic imperative for inclusive growth and prosperity.

### 2.1 Skills development and industrial needs

Prominent economists such as Theodore W. Schultz (1960, 1961), Gary S. Becker (1962, 1992, 1994) and Jacob Mincer (1974) view human capital as one of the most important factors in a country's economic development. One of the main approaches to human capital creation is formal education and training. That education and training substantially increase productivity and wages, thereby boosting socioeconomic development as a whole, is well documented (OECD 2001; Kwon 2009; Hanushek 2013; Sianesi and Reenen 2002; Absalyamova et al. 2015). Solid skills development can also enhance individual economic wellbeing, social inclusion and personal development (OECD 2001, 2014; Salmi 2017; Mupimpila and Narayana 2009).

The latest advances in information technology (artifical intelligence, for instance) have increased the demand for advanced cognitive skills and lifelong learning. At the same time, the accelerating rate of technological change means that the skills and knowledge learned in school and the workplace can rapidly become obsolete (Kim and Park 2020; WEF 2020). Moreover, new and complex knowledge and skills need to respond to rapid changes in workplace technologies. Thus, workforce upskilling and reskilling has become more urgent for nations to maintain their competitive edge (Riboud, Savchenko and Tan 2007). Yet many companies are struggling to find enough qualified workers to fill positions, with adverse consequences for their business and the economy at large (Fitz-Enz 2009). Cambodia, similarly to many developing countries, is facing the critical challenge of filling skills gaps, which is one of the top concerns for employers. This problem is evident in Cambodia's education and training

system, where employers find it hard to recruit university graduates for job vacancies and new graduates struggle to find job opportunities that fit their career aspirations (NEA 2018).

Noticeably, skills and qualifications from education and training systems are varied in terms of market value and effectiveness (Müller and Gangl 2003). These skills and qualifications are usually believed to be key assets for young people to obtain jobs in the labour market (Gangl 2003). Although the level of education and training attainment does not guarantee young jobseekers will be employed, the skills and qualifications are still one viable resource available for the workforce in most cases (Ashton and Sung 1992; Elder 2014; Heang, Khieu and Elder 2013). Despite the promising investment in education, competition between jobseekers creates a mixture of opportunities. A few highly competent individuals tend to enjoy a plethora of employment benefits, while many others with less education and competence seem left behind (Brown, Lauder and Ashton 2011), creating employment inequality across most economic sectors. Thus, education and training systems need to deliver high quality education and training that evolves quickly enough to meet the demands of employers and industries, thereby improving employment and employability among youth and graduates.

As technological development continues to advance towards non-human operating systems (Sharma and Jain 2020), workforce skills and knowledge could become far less relevant (Kim and Park 2020), and the skills shortages and mismatches in developing countries such as Cambodia could worsen. More importantly, the developing world is also confronting a gargantuan challenge to upgrade and deploy new technologies, while the ability to absorb foreign technologies rests largely on the availability of skilled, competent workers and the skillsets required for those new technologies (Abbas and Foreman-Peck 2008). If simple routine tasks were done or replaced by automatisation or even moved to cheaper-labour countries, the competitiveness of cheap labour in Cambodia could be lost at a time when many Cambodian workers are continuing to demand higher wages. Thus, enhancing the capabilities and skills of the workforce through skills training and skills upgrading with essential skills and competence plays a crucial role in Cambodia's industrial development.

### 2.2 Types of workforce skills development

TVET has been mainstreamed and embedded in education and skills development systems throughout the world. According to UNESCO's official definition, TVET includes formal, non-formal, informal, and workplace training, and it gives learners a wide range of and flexibility in learning experiences relevant to the world of work. It encompasses both initial skills development prior to employment (pre-employment) and reskilling and upskilling through further education and training during (in-employment) or after employment (post-employment) (UNESCO-UNEVOC 2006 cited in Catts et al. 2011, ix). In a broader sense, in some countries and organisations, vocational education, technical and vocational education, vocational education and training, workforce education, vocational skills development (VSD) and so on are used as equivalent terms for TVET (Hollander and Mar 2009; OECD 2010). Regardless of context-specific definitions, the primary goal of TVET is to equip learners with the knowledge, skills, competencies and abilities needed for specific occupations based on industry standards (ECDVT 2014).

In this paper, the terms TVET and VSD are used interchangably, with a focus on formal, job-specific pre- and in-employment education and training programs. Pre-employment programs cater for workers of all skill levels – lower, medium and higher, include short-term training as much as industry-oriented higher education, and lead to some kind of certification and the

acquisition of industry-specific skills. Likewise, in-employment VSD caters for workers across different skill levels, but after they join an industry, and could also be provided or certified by a third party, also leading to industry-specific skills. The following sections explain initial education and training and workplace skills training, which also capture the features of pre- and in-employment VSD in this study.

### *2.2.1 Initial education and training*

Initial education and training is an essential part of worker skills development, and can be a valuable asset for graduates entering the labour market if the skills, qualifications and credentials produced by an education and training system are relevant to industrial skills needs. Employers also use educational qualifications as a screening device for recruiting and selecting new applicants (Spence 1973 cited in OECD 2001). Employees use their initial education and training as a tool for negotiating employment conditions, which can explain wage differentials between individuals and across firm categories (OECD 2001).

Initial education and training serves as a foundation upon which individual workers' skills are built. This initial education is usually considered a master key to unlock individual workers' full potential for the world of work, complemented by further education and training after workers enter the labour market (Senker 2000; Wolbers 2005). Importantly, post-education training such as workplace or industrial skills training programs cannot replace this initial education and training. However, most education and training providers fail to ensure that their training programs contribute to workplace performance in response to meeting the expectations of employers. Thus, linking this initial education and training to workplace requirements remains a difficult task in most countries, due to rapid changes in technology demanding new skills and knowledge for work re-organisation and new production chains (Gibson and Sodeman 2015). Therefore, understanding the important relationship between initial education and training and industrial skills requirements is a key to building a responsive education and training system to meet the current and future needs of the labour market.

### *2.2.2 Workplace skills training and informal learning*

Most new labour market entrants will receive a certain amount of specific skills training offerred by companies. Such training is usually intended to enable workers to acquire or to improve their job-specific skills and knowledge through on-the-job training, off-the-job training and informal learning, as part of employers' corporate strategies or human resource development plans (ECDVT 2014; Selesnick 1981). On-the-job training, a popular form of workplace training, is incorporated into workers' normal work, in which workers learn a particular skill by doing a specific job or task, whereas off-the-job training usually requires them to be away from their normal work to participate in designated training outside of the firm or workstation (ECDVT 2014). A workplace is a significant site of formal and informal learning opportunities, brought about by the type and nature of work and employees' social interaction within the workplace (Caldwell 2000; Thang, Quang and Buyens 2010; Nguyen, Truong and Buyens 2011). However, most workplace learning is informal and low cost (Rainbird 2000), provided for low-skilled workers in low value-added production chains, reflecting that most low-skilled workers will miss high-order skills training opportunities in most cases.

Workplace training for highly skilled employees focuses on productivity improvement and competence building. This includes technical, management and entrepreneurship skills in a complex form of skills and knowledge. For low-skilled employees, the focal training is

generic, routine, occupational health and safety, and basic information technology (OECD 2013). However, manufacturing and services firms require not only technical but also life and soft skills, allowing their employees to adapt to rapid changes (Froy 2012; Gibson and Sodeman 2015; Nguyen, Truong and Buyens 2011). In practice, only a small number of employees have access to formal skills training, usually given to highly skilled employees in large firms, whereas small and medium-sized enterprises (SMEs) limit the use of skills training programs (OECD 2013; Rainbird 2000; Selesnick 1981). Due to factors such as time pressure, limited financial resources, negative perceptions towards employee training, and so forth (Panagiotakopoulos 2011), SMEs are more likely to train their workers through informal knowledge-intensive activities to equip them with necessary (or new) skills for production or operation requirements (OECD 2013; Vermeulen 1981). Across industries, most firms favour informal on-the-job skills training over formal off-the-job skills training for their employees. Thus, understanding employers' preferences for in-house skills training is of great importance to align future curriculum development with employers' needs.

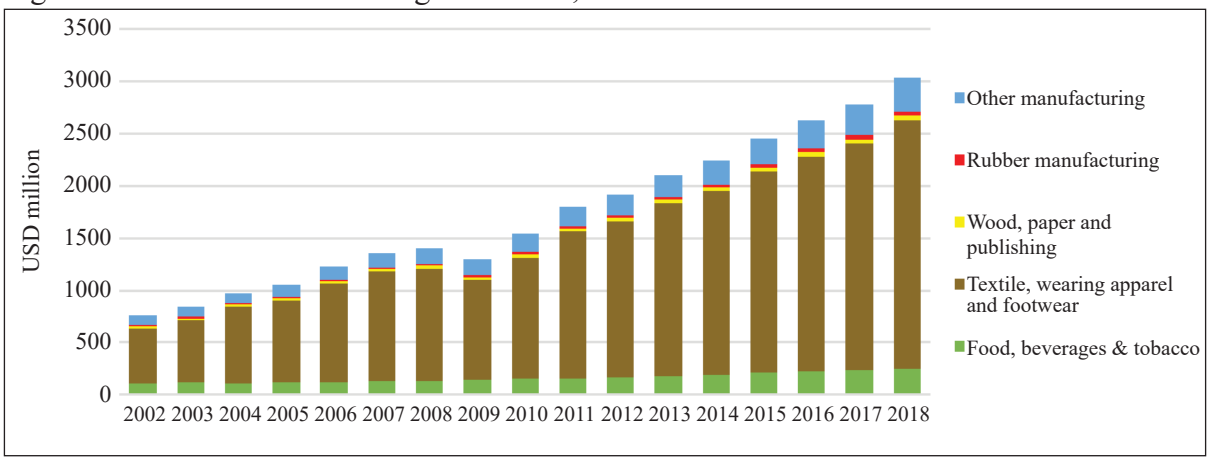
## 3. Workforce skills development and the labour market in Cambodia

### 3.1 Overview of the economy and manufacturing industry

Cambodia achieved robust economic growth over the decade preceding the Covid-19 pandemic. Before the pandemic, the country's GDP tripled from USD4.1 billion in 2002 to USD13 billion in 2018, with an impressive annual GDP growth rate of around 7 percent. The economic expansion in manufacturing (from USD758 million in 2002 to USD3 billion in 2018), construction (from USD233 million to USD1.3 billion) and services (from USD1.5 billion to USD5.1 billion) was driven by foreign direct investments, which were largely catalysed by government-led business environment reforms.

Cambodia's manufacturing includes textiles, apparel and footwear; food, beverages and tobacco; rubber; wood, paper and publishing; and other manufacturing (e.g. non-metallic manufacturing; basic metal and metal products). All these subsectors grew in value added over the 15 years to 2018 (see Figure 1). This reflects the overall growth of Cambodia's manufacturing industry, where the production of textiles, apparel and footwear was the largest share among the sub-sectors (NIS 2020). The subsectors of rubber manufacturing; wood, paper and publishing; and other small manufacturing subsectors are increasing but still in small volume.

Figure 1: Share of manufacturing subsectors, 2002–2018




Source: National Account 2020 (NIS 2020)

The textile, apparel and footwear sector accounts for a large employment share of unskilled and low-skilled workers, especially women from rural areas. This subsector has contributed to Cambodia's economic growth via exports to the United States and the European Union for more than 20 years. For example, the production of textiles, wearing apparel and footwear was worth USD2.4 billion (18.2 percent of GDP) in 2018 (NIS 2020), while the total value of import of textiles and articles was USD5.4 billion and its export was USD13.1 billion in the same year. The exports of these subsectors made up over 70 percent of total exports, making a significant jump from 36 percent in 2002.

The production of food, beverages and tobacco added up to USD254 million (1.9 percent of GDP) in 2018, up from USD114 million in 2002 (NIS 2020). This subsector has an important role in the country's economic diversification, food security and agricultural development, as Cambodia imported USD1.9 billion of related products in 2018, implying that Cambodia's local production capacity remains weak. Therefore, improving agricultural production and development would need a certain amount of technical and human resources with a well-designed strategic initiative for the sector.

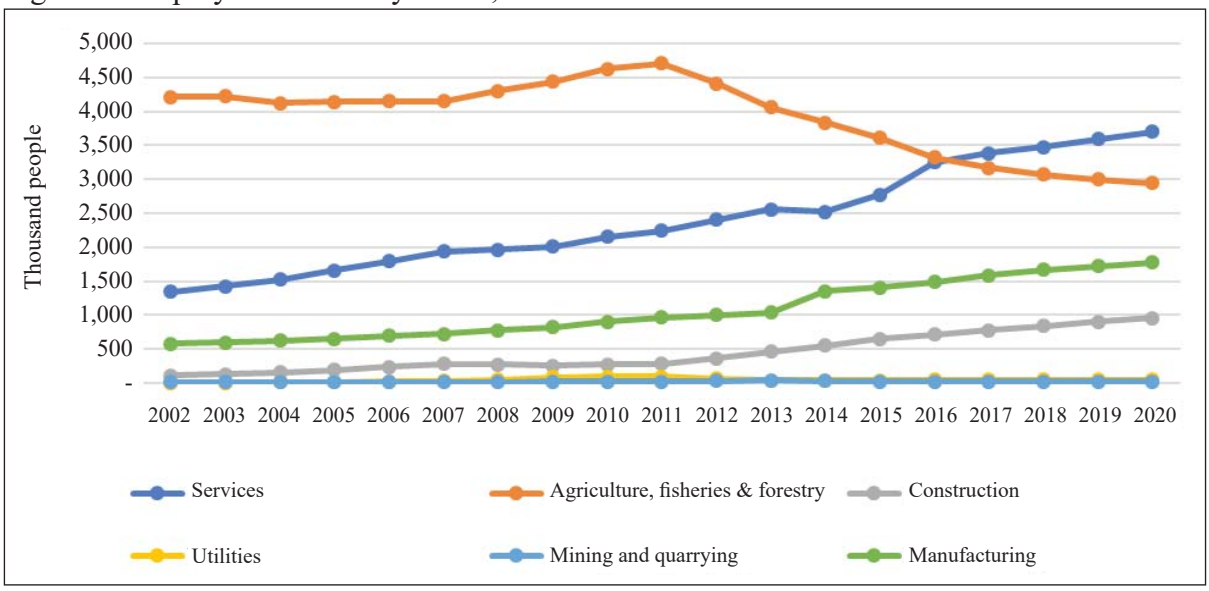
Electrical and electronic (E&E) assembly is, among the subsectors of other manufacturing, a quickly growing nascent sector following a strategic shift in many Japanese firms to move their E&E component production from China and Japan to Southeast Asian countries like Cambodia. In 2016, the total capital investment in E&E was valued at USD227 million, while its exports increased from about USD6 million in 2012 to USD458 million in 2016 (Ven and Sry 2017). This sector is promising for the future development of Cambodia's high-skilled labour sector.

Manufacturing is still a labour-intensive industry, characterised by unsophisticated production chains and the employment of large numbers of unskilled and low-skilled workers, especially young women from rural households. One exemplar is that about 60 percent of garment and textile factories in the industry are in the forms of cut, make, trim (CMT) activities and those low value-added production steps require fewer worker skills (RGC 2017). In assembly plants, only low-skilled and low value-added jobs, such as assembling key component parts and screwing, are available for labourers in production lines. This illustrates that Cambodia has an unsustainable, shallow economic foundation for the country's economic development (ADB 2015). Therefore, to meet the current and future industrial skills needs, Cambodia must put more effort and resources into workforce skills development.

### 3.2 Employment in the labour market

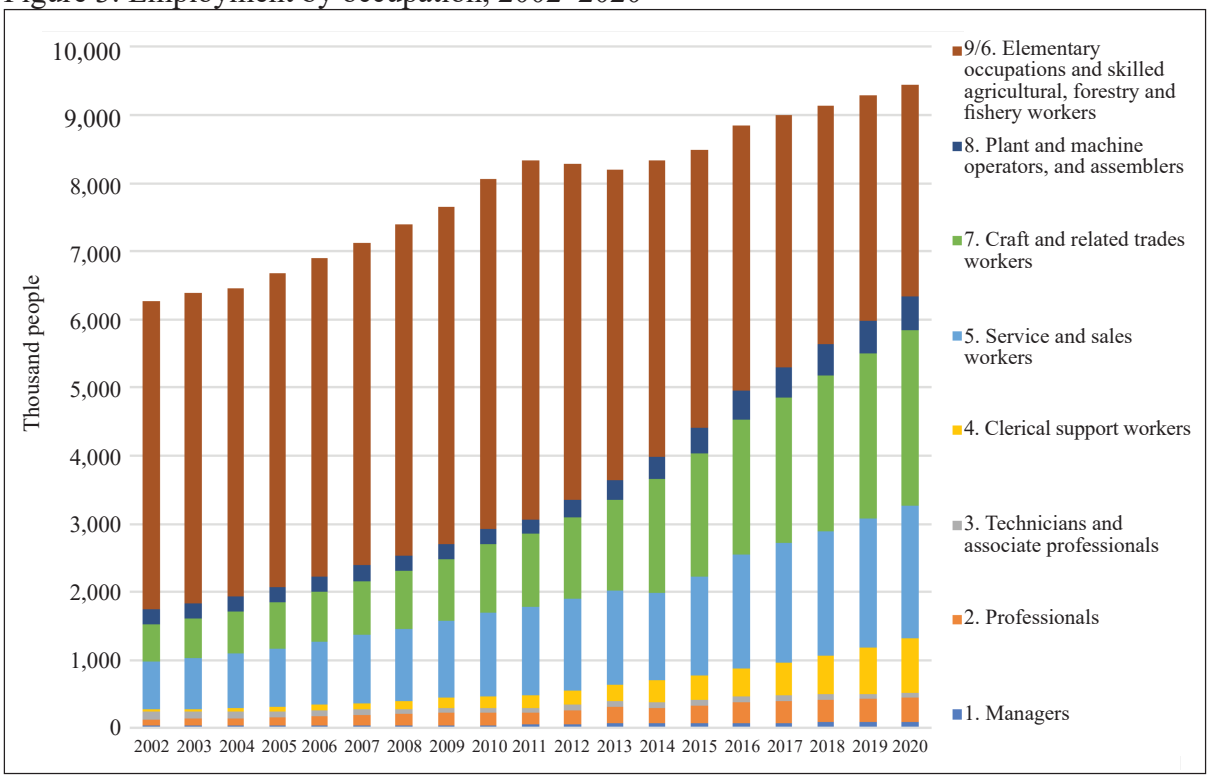
At the time of the 2017 Cambodia Socio-Economic Survey, 65.7 percent of the population was of working age (15–64 years old), with 84.3 percent of that in the workforce (NIS 2018). The high labour force participation rate is a good sign for the economy. Figure 2 shows employment trends by sector between 2002 and 2020. Structural change is evident in the decline in the number of people employed in agriculture, fisheries and forestry that declined dramatically from 4,214,000 in 2002 to 2,943,000 in 2020, and concommittant rise in the numbers of those employed in manufacturing (from 580,000 to 1,773,000), construction (from 112,000 to 953,000) and services (from 1,347,000 to 3,704,000). The share of agriculture, fisheries and forestry in total employment contracted by about 30 percent, while the shares of services and manufacturing trippled and that of construction increased almost eightfold. This pattern points to the future demands for workforce skills at different levels by industry and sector, where and what the future jobs may be, and the skills that are likely to be in high demand, particularly in manufacturing industry – the focal growth sector for transformation in IDP 2015–25 (RGC 2015).

Figure 2: Employment trend by sector, 2002–2020




Source: ILOSTAT, accessed in Jan 2020

Figure 3: Employment by occupation, 2002–2020




Source: ILOSTAT, accessed in Jan 2020

Workers in low-skilled and unskilled low-wage jobs in agriculture, manufacturing, construction and services dominate Cambodia's labour market, with only a small minority in high-skilled and professional jobs. Figure 3 shows employment by occupation. Between 2002 and 2020, the numbers of service and sales workers rose from 702,000 to 1,955,000, of craft and related trade workers from 551,000 to 2,583,000, of clerical support workers from 33,000 to 796,000, and of plant assemblers and machine operators from 222,000 to 480,000. The numbers of managers increased from 45,000 to 90,000 and of professionals from 83,000 to 359,000, while the number of technicians and associate professionals decreased from 115,000 to 69,000.

As the services and manufacturing sectors expanded (see Figure 2), the number of workers in elementary occupations and skilled agricultural, forestry and fishery jobs dropped from 4,525,000 to 3,115,000 and this downward trend is expected to continue as workers leave these traditional occupations to employment in other sectors.

### 3.3 Skills attainment and education levels of the workforce

Similarly to many developing countries, Cambodia has faced chronic skills gaps and shortages for decades (ADB 2020), reflecting the weak outcomes of the country's education and training system. More specifically, the limited foundational knowledge and inadequate employability skills of young graduates have long been a major concern of many employers (HRINC 2010; Khieng, Madhur and Chhem 2015; Madhur 2014). Above all, the low level of educational attainment and skills acquisition in the workforce remains a bottleneck to implementing Cambodia's ambitious development agenda (UNDP Cambodia 2014). That Cambodians attend 3.6 fewer years of basic education than the average of 8.4 years for developing countries throws into sharp relief the immensity of the workforce challenge in Cambodia (UNDP 2018).

The following statistics from the Cambodia Socio-Economic Survey 2017 provide snapshot information on adult education levels. At the time of survey, 12.0 percent of the workforce had no education, 26.0 percent had completed and 31.7 percent had not completed primary education, 15.5 percent had completed lower-secondary and 8.2 percent had completed upper-secondary education, and only 6.6 percent had completed postsecondary education (NIS 2018). This indicates the limited availability of human resource competencies for Cambodia's industrial transformation, meaning the workforce is not nimble enough to adapt quickly to rapid technological and organisational change in the workplace (RGC 2017).

Education and training is important, but it is not the whole story. Employers in the Cambodian labour market need workers with more than academic and vocational qualifications. They seek applicants who have also acquired specific practical skills and work experience. Even so, the relevance of education and training is a top concern for most employers when recruiting new employees (NEA 2018; Khieng, Madhur and Chhem 2015; HRINC 2010), as the skills and knowledge imparted through education and training might not match their current and future business needs. This means that employers have to use various hiring tactics and recruitment methods to attract the talent they are looking for. External factors, such as employment conditions, unemployment rate, labour availability, recruitment policies of competitors, employment regulation and legislation, can also affect the recruitment process of an organisation (Autor 2001, 2009). Put simply, most employers are keen on an optimal method for recruiting new employees or promoting existing employees and conforming with corporate business and human resource strategies (Lepak and Snell 1999). Without any proper solutions to the current education and training challenges, young Cambodians entering the labour market risk losing their education and training premiums because employers seem to distrust the validity and rigour of their academic credentials and vocational qualifications.

### 3.4 Technical and vocational skills development

Cambodia's nine-year basic education system is universal, compulsory and free for all children. Children who have completed basic education can go on to upper secondary school (general stream) or follow a TVET pathway. Completing all the TVET certificates (1, 2 and

3) is considered equivalent to grade 12 completion, and students can then move up to a higher diploma level (in a related field in TVET). Students who have completed grade 12 can either go on to university or to a postsecondary TVET institution, and they generally have many choices of fields of study (see Appendix 1).

The Ministry of Education, Youth and Sport (MoEYS) is responsible for general education, non-formal education and higher education, and the Ministry of Labour and Vocational Training (MoLVT) is responsible for TVET. The administration and management of higher education is further complicated by line ministries' responsibilities for specialised universities (Un and Sok 2018). The Royal University of Agriculture, for example, comes under the Ministry of Agriculture, Forestry and Fisheries, and the University of Health Sciences comes under the Ministry of Health. Under the MoLVT, there are 38 public sector, 44 private sector and 21 NGO training institutions across the country (MoLVT 2020), with most of the private training providers being small, family-run organisations relying on student enrolment fees (ADB 2016b). Most TVET institutions and trade schools are, however, located in urban areas, making it hard for young rural Cambodians to participate in training and technical education.

In general, enrolments in TVET programs are relatively low. For instance, the number of TVET students in 2018/19 was 84,840, including all levels from short courses to postgraduate programs in both public and private institutions (MoLVT 2020), whereas enrolments in higher education alone amounted to 211,484 in 2017/18 (MoEYS 2019). Of the almost 85,000 TVET enrolments, only 528 were in postgraduate programs, 12,153 in bachelor degree programs, 11,754 in higher diploma courses, and 4,817 in TVET certificate courses; the majority (55, 558) were enrolled in short courses (see Appendix 2). Total enrolments in TVET certificate, higher diploma, bachelor degree and postgraduate degree levels have improved from 11,479 in 2009/10 to 39,252 in 2018/19. This upward trend reflects government efforts to boost student enrolments and improve TVET quality (RGC 2017).

Technology subjects are of growing importance for Cambodia's industrial transformation, but TVET is still perceived as low status or as a second best option among high school graduates (RGC 2017). TVET's lack of attractiveness, together with issues of low quality and lack of relevance to the labour market, remain major challenges in Cambodia (RGC 2015, 2017, 2018). Moreover, most postsecondary TVET institutions only offer a very small number of study subjects, leaving students fewer options and fuelling skilled labour shortages.

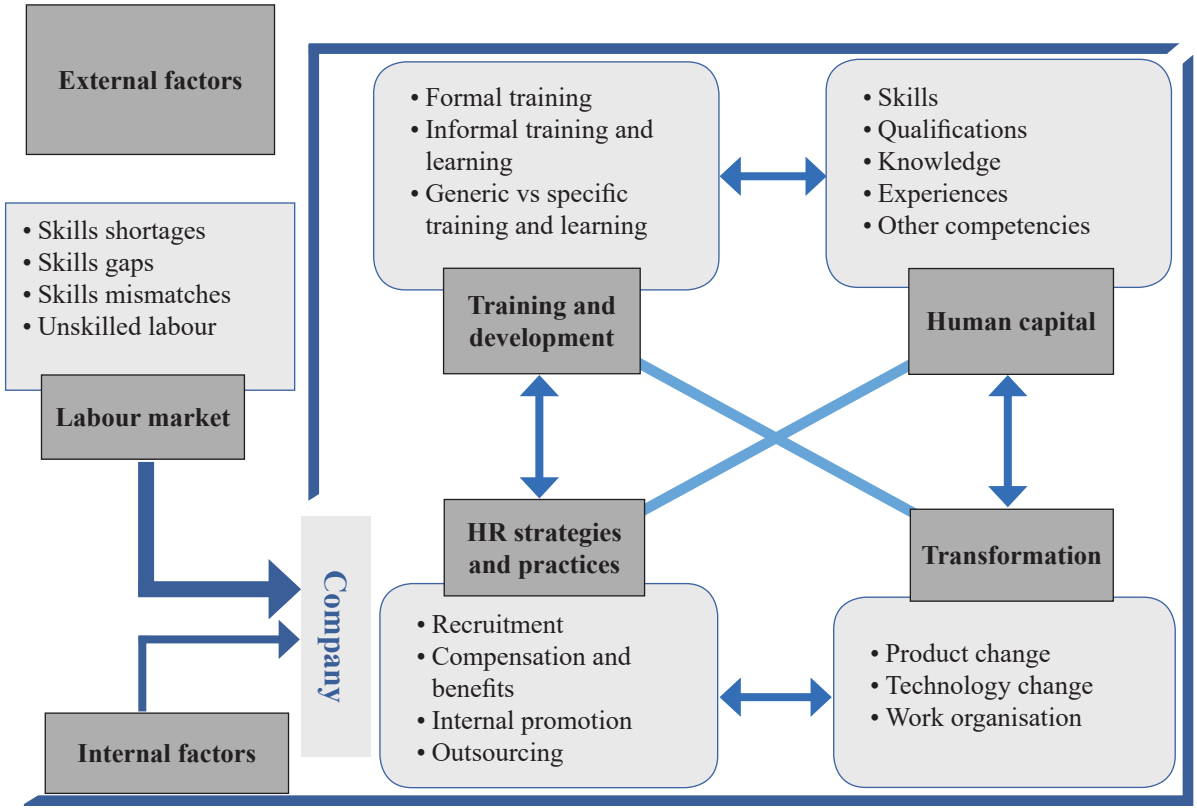
The most popular subjects in public TVET institutions are civil construction, electrical engineering, electronics, mechanics, mechatronics, information technology, business management, accounting and finance, and marketing. Students can enroll in these subjects at different levels including TVET certificate, higher diploma and bachelor degree. Unlike long-term formal TVET programs, short-term courses are relatively diverse, last between one week and four months, and provide a wide range of subjects such as basic agriculture, basic electrical engineering and wiring installation, electronic repair, basic computer skills, basic food processing, masonry and construction, animal feeding and processing, and sewing (MoLVT 2020). These courses provide learners with basic skills as part of non-formal training to improve local poverty through livelihood generation. However, these short-term programs do not prepare people to be technicians or skilled workers in the long run, and hence limit future employment and vocational perspectives.

## 4. Analytical framework

This study applies the analytical framework shown in Figure 4, which indicates the interrelationships between human capital (specifically skills and knowledge), transformation, human resource strategy, and training and development within a company, where these key elements contribute to that company's growth and success (Benson, Gospel and Zhu 2013; Abbas and Foreman-Peck 2008; OECD 2001; Hanushek and Woessmann 2020; Akter 2016). Human capital here means skills, knowledge, experience, and other attributes that employees have gained from formal, non-formal and informal education and training, whether from TVET providers and universities, or from private companies. Transformation in this study refers to changes in products, technology, and work organisation for the purpose of improving productivity or fulfilling market demand. This transformation is believed to be intertwined with human capital, whether employees' skills and knowledge enable transformation or vice versa.

Although transformation has a certain link with employees' skills and knowledge, the skill needs of the company or the requirements of any transformation would be supported by the company's human resource strategies and training and development initiatives (Lepak and Snell 1999). The latter are a means to ensure that employees possess the skills and knowledge needed for transformation, while the former (recruitment, selection, compensation, promotion and outsourcing) are used to mitigate or overcome the challenges and problems of skills supply in the labour market.

Figure 4: Analytical framework




Note: This framework mainly focuses on human capital, transformation, human resource strategies, and training and development, though the authors acknowledge that external and internal factors (environmental factors) also interact with these themes and influence the framework. However, this simple framework cannot capture the complete picture of interrelated themes or factors that may affect the relationship between vocational skills development and transformation within and outside the company.

Source: Authors' compilation

Two other main factors strongly affect the elements of the analytical framework. Labour market (failure) factors, including skills shortages, skills gaps and unskilled labour, lead to certain changes in a company's recruitment and training processes as employers may expect higher skills from job seekers (Malik and Venkatraman 2017). The internal factors and characteristics of a company are also connected to the framework. Such factors as leadership and management styles, organisational structure, financial capital, and corporate strategic plans can strongly influence a company's direction. However, this paper does not discuss these factors in detail.

The rest of this paper is based on the analytical framework described above and presented in Figure 4, which anchors the core themes pertaining to the linkage between VSD and transformation within a company. This relationship between VSD and transformation is analysed through coded passages or statements that are related to the core themes that reflect how a company perceives and uses the skills and knowledge of employees, and how it deals with the challenges and problems of skills supply in order to meet the skills needs of the company.

## 5. Research methods

This study adopted a case study approach to understand how companies or employers perceive the skills and knowledge of their workforce in relation to the skills needs required for a certain level of transformation within companies. This approach was adopted to complement the firm-level survey in order to further explore the interrelationships between VSD and industrial transformation in the "Skills for Industry" project.[2] The case studies of manufacturing companies provided an in-depth understanding of persistent skills development challenges in the Cambodian labour market that have remained unresolved for decades. The following subsections describe the data collection instruments and data analysis.

### 5.1 Data collection tools

This study used data gathered from follow-up qualitative facet-to-face interviews with 18 firms selected from the 101 surveyed firms. We conducted key informant interviews with senior managers and a production head or representative in each firm. These informants were believed to have comprehensive knowledge of their firm's practices and experience, especially in the areas of hiring and training, growth and transformation, and TVET programs (see Table 1). The interview questions were set to gather information from between 2015 and 2019 (until the interview stage was finished). Each interview typically lasted between 60 and 90 minutes. All the interviews were recorded and transcribed to capture all aspects of employers' perceptions of and experience with skills requirements and employees' skills and knowledge within their companies. In addition to the interviews, observational fieldnotes were taken for each interview to further understand the company context, factory environment, production work, and interviewee interactions with the interviewers. These fieldnotes played a fundamental role in building a general understanding of each interview and also served as a basis for additional analysis.

2 This project is a part of a bigger research project led by the Zürich University of Teacher Education, using data from Bangladesh, Cambodia, Ethiopia, Laos, South Africa and Vietnam, to identify and better understand the critical factors that help or hinder the contribution of vocational skills development to inclusive industrial growth and transformation in low- and middle-income countries. In Cambodia, this project focuses on three main sectors – garment, electrical and electronic assembly, and food processing. The firm-level survey was conducted between September 2018 and January 2019 and the results were documented in a working paper (Ven and Veung 2020) and accompanying policy brief (Veung and Ven 2019). The follow-up qualitative interviews were conducted between October and December 2019. The findings of that follow-up study are documented in one policy brief (Veung and Ven 2021) and this paper.

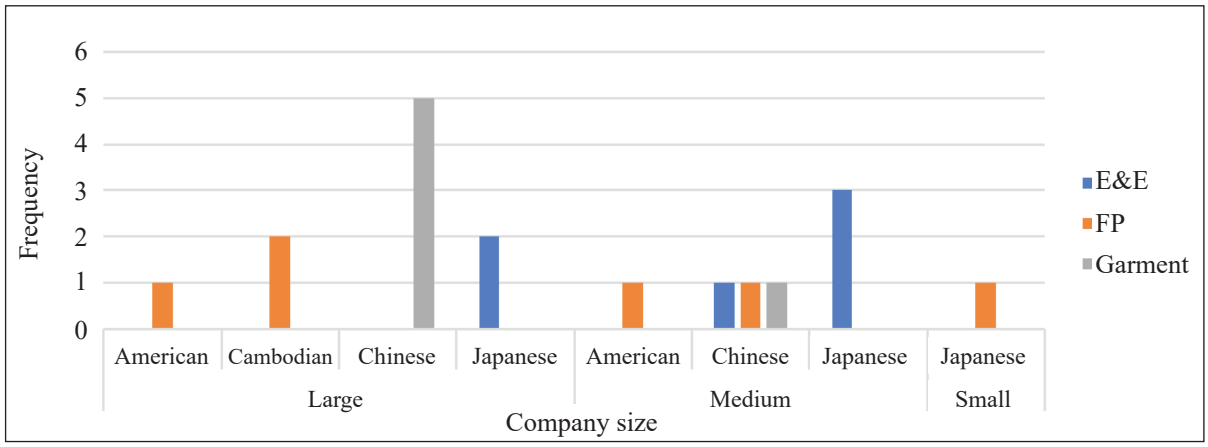
Table 1: Interview question structure and themes

| Hiring and training | Growth and transformation | Technical and vocational programs |
|---|---|---|
| • Occupational levels in production<br>• Recruitment criteria<br>• In-employment TVET programs | • Production technology changes<br>• Product changes<br>• Work organisation<br>• Transformation and skills utilisation<br>• Growth and factors of growth | • Specific, valuable TVET programs for companies<br>• Involvement with formal pre-employment TVET programs<br>• TVET/schooling coverage (percentage of employees with TVET/schooling) |

Table 1 outlines the three main sections of the interview question structure on which this study concentrated in order to comprehensively understand company hiring and training practices, to explore linkages between skills and company-level transformation, and to specifically find current and future needs of technical and vocational programs at the company level. The first section of the interview questions focuses on hiring and training, which includes questions relevant to occupational levels in production, recruitment criteria and practices, and specific in-employment VSD programs. The second section deals with growth and transformation, aiming to gather information related to changes in product technologies, product types and work organisation. It also looks into company transformation and skills utilisation, and growth and growth factors with companies. The third section asks about technical and vocational programs that employers consider valuable and important for their companies. It also collects information pertinent to different forms of, or existence of, industry linkages and collaboration between TVET providers and private companies.

Twenty companies initially participated in the in-depth interviews. However, two companies in the E&E sector were dropped from the sample either because of poor audio quality, which made interviewees' answers hard to transcribe, or because some of the answers did not respond to the interview questions. The final sample therefore comprised 18 companies, six from each sector (garments, E&E, food processing). The subsamples included companies with diverse characteristics (such as firm size and type). This meant data analysis could capture the perspectives of employers across the spectrum (for more detail, see Appendix 3).

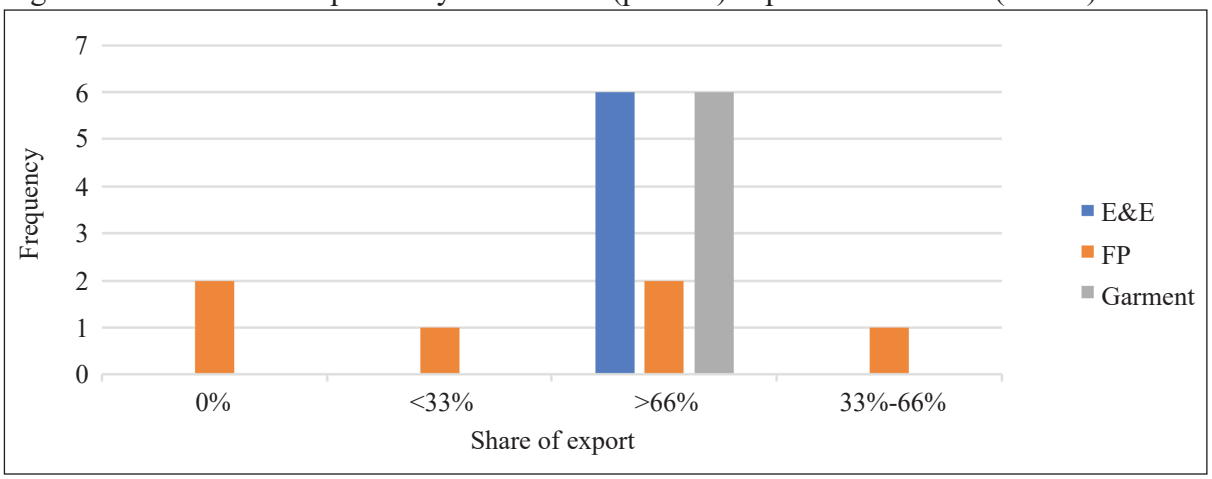
Figure 5: Number of companies by size, nationality of ownership, and sector (n = 18)




Source: Authors' calculations

Figure 5 shows the number of companies by size, nationality of ownership, and sector. There are ten large, seven medium and one small company. Disaggregated by nationality of ownership, there are eight Chinese, six Japanese, two North American and two Cambodian companies.

Figure 6: Number of companies by the amount (percent) exported and sector (n = 18)



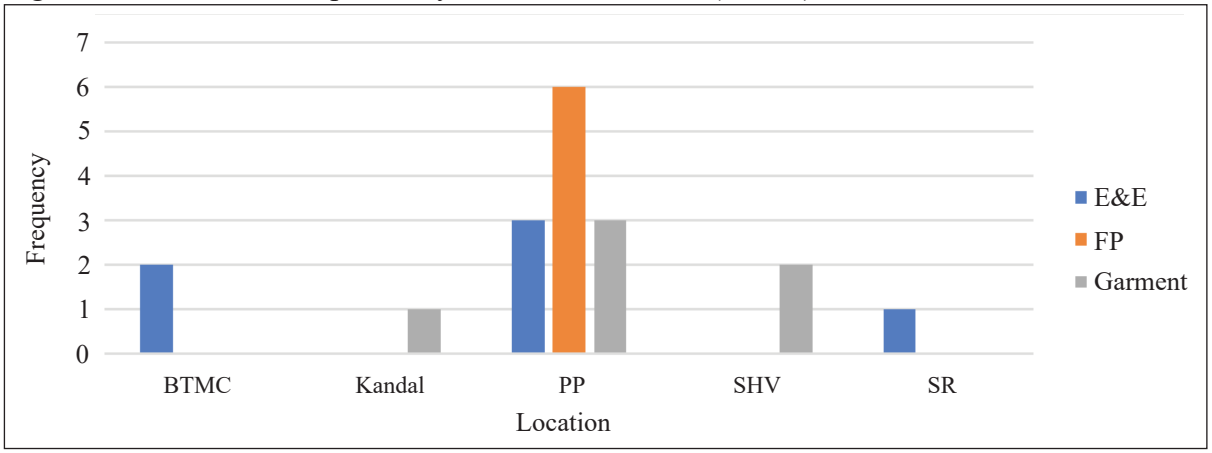

Source: Authors' calculations

Figure 6 shows the number of companies by the amount exported and sector. Fourteen companies – all the E&E and garment firms and two food processing firms – export more than 66 percent of their products. Of the remaining food processing companies, two do not export their products and the other two export less than 66 percent of their products.

Twelve of the interviewed companies are located in Phnom Penh city, two in Preah Sihanouk, two in Banteay Meanchey, one in Kandal and one in Svay Rieng province (Figure 7). All six food processing, three garment and three E&E companies are situated in Phnom Penh. The large number of Phnom Penh-based companies reflects the sample used for the initial firm survey and the fact that Phnom Penh is Cambodia's economic centre.

Although the study included different types of companies, the number of interviewed companies and respondents was small, which has limitations in terms of data rigidity, representativeness, and generalisation for the three selected and other manufacturing sectors.

Figure 7: Number of companies by location and sector (n = 18)




Source: Authors' calculations

### 5.2 Data coding and analysis

We used Nvivo 12 for coding and data tabulation. The interview transcripts were read carefully line by line and data and information coded. The main codes and subcodes were created based on the interview question structure and themes (see Table 1). Employers' perceptions of workforce skills and qualifications, company skills requirements, relationship between VSD and transformation, and strategy to overcome human resource challenges and build the skills required for transformation were extracted from the coded interview data into a large interrelated data matrix using a framework matrix. Then, based on this tabulated data, coded themes with case numbers were analysed and compared. However, this study was not intended to compare the different perceptions and experiences of respondents (management representative/human resources manager and production head/production manager) from within the same company. Rather, it aimed to explore the linkage, if any, between skills and transformation within companies and across sectors.

## 6. Research findings

This section presents the findings of the company case studies. The findings cover various aspects including employer perspectives on skills and qualifications versus the skills needs of companies, transformation and its implications for VSD, and strategy to overcome the skills challenges and problems posed by the changes in products, technology and work organisation.

### 6.1 General perceptions of skills and qualifications

Employers are one of the key players in the labour market. They demand the skills and knowledge that match their skills requirements, among which industry or company-specific skills and knowledge are most needed for company operation and growth. Regarding the skills and qualifications of employees, most companies generally expressed their concerns and complaints. Notably, they reflected on their dissatisfaction with graduates' credentials from Cambodia's education and training system, which in their view are lacking in quality and relevance and are therefore not a main criterion for employee recruitment, selection and promotion. Consistent with the findings of previous research studies (NEA 2018; Khieng, Madhur and Chhem 2015; HRINC 2010), the skills and knowledge of most TVET or university graduates did not match what the employers wanted. In a similar vein, the interviewees in this study reported their general perceptions of their employees' skills and qualifications from the education and training systems to meet their company skills needs. The following subsections describe the employers' perspectives of and experience in recruiting employees and using the skills and knowledge of their workforce in their companies and production.

#### *6.1.1 Skills shortage and recruitment difficulty*

Most interviewed companies faced difficulties in recruiting highly skilled and qualified employees for mid- or high-level positions. Workers with technical skills and qualifications were even harder to recruit in provincial areas. In general, the skills shortage was viewed as a challenge to most companies' employee recruitment and selection practices. However, most companies found it less difficult to recruit general workers or operators, mainly because they did not require these workers to have any qualifications.

Most respondents from E&E, garment and food processing companies reported that production-specific technical skills were needed most. They found it very difficult to find and recruit people with these specific skills. For example, E&E companies would benefit from having

more employees with TVET skills and qualifications as their production is more technically or technologically related to modern, advanced machines or systems, but they could not find many who had the skills and knowledge that matched the company requirements, as an E&E production representative of CE5913F[3] explained:

> It's hard to recruit data checking technicians who can use PCMMs [portable coordinate measurement machines]. They are in very short supply. Mostly we recruit from abroad. It's hard to find someone [who knows how] to use high tech machines.

Similarly, some garment company respondents said it is hard to find garment technologists or even people with garment-related degrees or qualifications because there are so few of them, as explained by the human resources respondent from CGBC830:

> Employees have those qualifications in China, but only a few in Cambodia.

There is clearly a shortage of workers with high-level garment-related technical skills. Most of the garment factories in Cambodia that have their headquarters in China tend to hire skilled Chinese employees to manage their production lines and Cambodian workers to fill subordinate roles. The production respondent from garment company CGBC830 questioned why Cambodia still lacks skilled garment workers given that the sector is well established and a main contributor to the economy. To him, it seemed counterintuitive that the skills and knowledge of Cambodian garment workers were still lagging behind the sector's overall development.

> From my point of view, I want to have research on what we lack and what we should develop, and there should be a development plan for those sectors. As for the garment sector in Cambodia, it's been 23 years since its establishment in 1996, but we still lack skilled workers.

Similar to E&E and garment companies, food processing companies also experienced difficulties recruiting skilled employees with the right skills and qualifications. This was reportedly due to a general shortage of skilled labour in the sector. In the words of a human resources respondent from CF125571:

> There's some shortage of skilled employees.… It's difficult to find a skill.

Most companies across all three sectors experienced difficulty in recruiting employees with TVET qualifications. There was also a shortage of general workers and operators, as reported by some companies in Preah Sihanouk, Svay Rieng and Koh Kong, where special economic zones are located. When companies needed to hire a large number of production workers at once, recruiting could become highly competitive, not just in manufacturing industry but also in construction, services and entertainment industries. For instance, a factory manager from garment factory CG1099F explained how, when his factory expanded and required a larger workforce, he could not find enough workers, so the factory was unable to start a new production line.

3 This is an interviewee ID for this study. We conducted one interview with a representative from a human resource department (hr) and another with a person from production (pro) within one company. Moreover, our company codes starting with CE, CG and CF refer to E&E, garment and food processing, respectively. For example, "CE5913F Pro" means a respondent from a production department from an E&E company, while "CGBC830 hr" is a human resources respondent from a garment company.

> He doesn't really know the exact number of orders in the past. It has decreased from around 800,000 to around 300,000. This is because we can't find enough workers. The CEO purchased more land with a plan to build an additional factory, but we lack workers, so we postponed it. We don't know where to find more workers, so we have fewer orders on our books.

The fact that many companies have experienced skilled labour shortages, especially when wanting to recruit employees with technical skills and qualifications, suggests that recruitment difficulties are widespread. On top of that, employers' wariness about the general quality of education and training also influences their recruitment and hiring decisions for positions at all levels.

### *6.2.1 Skills gaps and low education and training among workers*

Besides the shortage of skilled workers, as documented in various reports (NEA 2018; RGC 2017, 2015), one of the lingering skills development issues in Cambodia is the skills gap resulting from low quality education and training. The dubious quality of education and training to some extent provokes employers' wariness about the rigour of employees' skills and qualifications. The severity of this skills gap is particularly apparent when companies start recruiting newly qualified graduates.

The quality of education and training in the workforce of the interviewed companies was generally low. In particular, general workers and operators had the lowest level of education and training among factory workers. According to a human resources respondent from garment company CGBBEBC, employees' skills and qualifications did not meet company requirements. There were many other similar cases in our study.

> Therefore, experience teaches us to be more aware; and in Cambodia, human resources are still limited. …Our Cambodian employees' skills are still limited.

Respondents from E&E companies experienced the same problem of employees lacking adequate skills and qualifications, even to the point where some employees were not up to their assigned tasks or could not perform well. They believed that the skills and knowledge developed through the Cambodian education and training system were neither of high quality nor relevant to the skills needs of their companies, as expressed by two human resources respondents from E&E companies:

> There are not many people with TVET qualifications, and some of them are not able to perform well. (CE1BD4F hr)

> Because even though they have been to training school, their training does not match the skills required. (CE166E20 hr)

Most employers pinpointed the failure of Cambodia's education and training system to equip the graduate labour market with the skills and knowledge needed in any industry. A human resources representative from food processing company CF3 even claimed that the skills and qualifications produced by the system could never be higher than, or match, the skills and knowledge requirements of most manufacturing companies. The situation as it currently exists leaves most companies little chance of finding graduates with satisfactory technical or specific skills, so they seem to employ workers with low education and training instead. The statement below clearly identifies the problem in the education and training system.

> It [skill] cannot be higher because there is a limitation, meaning that the knowledge and skills of the people are still limited. Most graduates have limited capacity, are nervous and lack confidence. It is not the same as in other countries, where students have strong skills and confidence. (CF3 hr)

Almost all employers agreed that, if employees had good education and training, it would be easier to introduce new products, adapt to technological change and reorganise work systems in their companies. The harsh reality, however, is that as far as employers are concerned, formal training programs are providing poor quality skills training that is irrelevant to their needs. This is because most TVET providers offer only generic training programs; there is a lack of industry-specific training.

It is no surprise that most employers have complaints about their workers' skills and knowledge, given that they employ a large number of low-skilled workers. For their part, TVET institutions need to not only ensure that learners acquire job-specific knowledge, skills and abilities that align with labour market demands, but also provide a wide range of skills training programs in different industrial trades. The next section describes employers' views on skills training programs and skills relevance in the labour market.

### *6.1.3 Lack of skills training programs for new industrial needs*

Generally, TVET schools in Cambodia provide generic skills training programs which are designed for various industries and companies. TVET programs cover various subjects, including electronics, electrical engineering, mechanics, mechatronics, food processing, biochemistry, and food technology. None of them are specifically designed for industry, however. E&E and food processing, as nascent manufacturing sectors, require workers with specific technical skills but face an uphill challenge of finding suitably qualified TVET graduates. This could be because their production technology or machinery or work organisation is new in Cambodia. Even so, the lack of industry-specific training programs is a major concern of industrial employers. The garment industry, which has long been one of the largest employers, has more skilled and experienced workers at its disposal, but without garment-specific qualifications.

More than half of the interviewed companies, according to our Likert scale data,[4] did not prioritise pre-employment TVET certificates in their hiring.[5] They found it difficult, costly and time-consuming to hire middle- and high-skilled workers with formal qualifications. For example, the wire industry was new in Cambodia, and training courses in wire manufacturing were non-existent. Although some people with TVET qualifications in electrical and electronic engineering sought jobs in this sector, they would not have any specific knowledge, skills or work experience relevant to wire production. Besides the dubious quality of TVET programs, training providers were delivering too few, if any at all, specific advanced skills training programs. Because of this, employers were reluctant to send high- or mid-level employees to participate in those programs, as the human resources representatives of two E&E companies explained:

4 We collected some Likert scale data during the interviews. This data was used to support or complement qualitative interview data. Because this is a qualitative study, just a few statistics from our Likert scale data are used, and only when necessary to support certain claims of interviewees.

5 This confirms the findings from our firm-level survey and indicates why the interviewed companies had few employees with formal pre-employment VSD (Ven and Veung 2020; Veung and Ven 2019).

> Another thing is that there is no wire production training in Cambodia, probably because it looks as though there are no wire production factories in Cambodia yet ... they [jobseekers/ graduates] may have TVET qualifications, but they have no work ability, so we would not give them priority either. (CE518AD hr)

> If Cambodia had a school that could allow them to learn and get more technical knowledge about the factory and get a certificate, maybe the company would send them to study, but in Cambodia there is no such school. (CE166E20 hr)

Similarly to E&E companies, food processing companies struggled to find employees with the skills and qualifications that matched their requirements; they lacked a great deal of skilled labour. This could be due to the lack of enrolments in related programs, though few universities or TVET schools offer such skills training programs in the first place. The situation is even worse in rural areas, where there are few TVET schools and a very limited number of industry-specific TVET programs. The programs that do exist are often in the form of short-term, basic skills training (MoLVT 2020).

> The first is skilled labour is in short supply. For example, we have had garment factories for about 20 years, but the Garment Manufacturing Association in Cambodia was only established relatively recently. Thus, when it comes to our food industry, we cannot find any [skilled labour]. It is not easy. (CF10395 hr)

As employers identified, training facilities and equipment are critical for the overall quality and relevance of skills training programs. Thus, the lack of training facilities and equipment could be a reason for the paucity of labour market-relevant skills, knowledge and competencies. Moreover, training facilities and equipment, no matter how modern, can quickly become outdated because of the rapid pace of technological change in manufacturing industry. This suggests that the skills and knowledge Cambodian TVET schools deliver would not be relevant enough or match company needs in terms of production technologies and processes. The following statements by human resources respondents from an E&E and a food processing company in Phnom Penh indicate an important relationship between the skills training and production technologies that should be available at school.

> If TVET schools were to improve their equipment, then it [skills training] might become useful for us. At the moment, the Ministry does not have any equipment that is as modern as the equipment in our factory. (CE4771 hr)

> We would recruit [Cambodian workers] if skills were a better match, but in Cambodia there is no such skill match because some of the machines are more advanced than those of the Ministry, and even [Cambodian] graduates trained abroad wouldn't be able to maintain them. (CF3 hr)

### *6.1.4 Pre-employment vs in-house training for employee reskilling and upskilling*

Both the quality and the relevance of most pre-employment training programs offered by Cambodian TVET schools were reported to be lower than the expectations and requirements of most interviewed companies, leading to recruitment difficulties and mirroring a deep-seated problem in the education and training system. The general lack of confidence in its quality and the skills and qualifications certified under the system is a tremendous worry for many employers seeking to recruit new graduates, while young graduates also face a serious challenge in securing a decent job that matches their skills and qualifications. Companies use certain methods to ensure they can meet their skills needs and production requirements. This

section focuses on how employers perceive pre-employment VSD programs and why they prefer in-employment VSD programs.

Our Likert scale data shows that most employers focused more on in-employment training, especially on-the-job training, for both high- and mid-level employees. Moreover, they agreed that providing on-the-job training was more useful to their high- and mid-level employees than providing TVET qualifications. This suggests that most companies prioritise in-house training in the form of informal on-the-job training, for both new and current employees. Employers placed less value on skills and qualifications acquired through the education and training system, according to the production representatives from companies CE5913F and CF3.

> Until now, the company has not found any TVET program that fits the demands of the company. (CE5913F pro)

> Second, we do not see how the government [public TVET schools] could possibly teach technical skills better than the company, because only the company can provide those technical skills. …we understand that the technical skills of the government [public TVET providers] cannot match the skills of the company, so if we send our employees to attend training, it would not be fruitful. (CF3 pro)

Based on the same respondents, in-employment (in-house) training was most valued and provided to current employees as it was company-specific and relevant to skills needs and production requirements, meaning that it would work best for companies in terms of costs, specifics, relevance, and industrial requirements. Even when high-level employees participated in external training, they were sent to the parent or related companies overseas, as illustrated in the following quotes:

> On-the-job training meets the specific work responsibilities of the employees. (CG16903 pro)

> If we send them to participate in training, it has to be at our other branch, but then the experience might not be very new because we make the same products. (CE166E20 hr)

As most employers questioned the quality of education and training in general, and of TVET in particular, involvement with formal TVET schools for employees' external technical skills training was very limited among the interviewed companies. In other words, it was hard to find any concrete linkage between these companies and TVET schools, as some respondents experienced. Some companies might not want to sacrifice employees' time on the production line for external skills training at TVET school, as they knew that there are not many specific skills training programs available and those that do exist are not relevant to their production specifics.

> We'll send employees to Thailand for on-the-job training. We don't send them to school [in Cambodia] to get TVET certificates because we don't have the time. (CE5913F pro)

> Only when it's related to their skills, for example, will we send them out to get trained in laboratory, heath, or safety. (CGBBEBC pro)

From the perspectives of the respondents, we can conclude that in-house training, especially in the forms of on-the-job training, trials (testing) and peer learning, is overwhelmingly favoured for employee reskilling and upskilling in most companies, while external, formal or non-formal skills training is mostly not valued due to such factors as cost, time, relevance, internal labour shortage, and other managerial issues. In short, in-house training is often seen as the only method for reskilling and upskilling current and future employees.

## 6.2 Transformation and vocational skills development

For this study, transformation refers to changes in technology, products and work organisation in companies. Transformation is often linked to company growth, and it is driven by a range of critical factors. Furthermore, transformation in the companies also implies certain skills requirements, or in other words, it demands additional skills for existing employees or new, different skillsets needed for operation or production. This section is devoted to discussing the key drivers of transformation and the linkage between transformation and workforce skills and knowledge.

### *6.2.1 Key drivers of transformation*

A range of driving forces of change in technology, products and work organisation were reported by the study respondents. One of the major drivers of transformation in production technologies was market factors, which included buyers' orders and demands for higher quality and quantity, as well as a company's production costs and product prices. For instance, the changing trends in the E&E market pushed companies to move ahead of their competitors to meet customers' expectations in terms of quality and prices, while fashion or model changes in the garment sector also led to new types of manufacturing equipment. Similarly, food processing companies claimed that changes in technology or products were due to customer demand that pressured manufacturers to produce goods to meet those expectations or surpass competitors' products. The following statements by three production respondents from CE4771, CGBBEBC and CF12557 indicate some of the factors that induce change:

> The main factor is competition because we are not the only company that manufactures those products. That includes international competitors as well. If we do not keep introducing new technology and products, we cannot keep ahead of the competition. (CE4771 pro)

> It [change in technology] depends on changes in fashions. When there are more models, we will respond accordingly, and there will be changes in machinery. (CGBBEBC pro)

> This is to meet market demands, mainly the factors that shape market trends. The need to increase production quantity and quality, while cutting costs. (CF125571 pro)

Influential buyers demand products that meet the latest market trends, leading to changes in products that sometimes require technology upgrading or new and modern production equipment. This happens in all three sectors. Old, outdated machines need to be replaced with new, advanced machines or technologies which are believed to make better products. Companies can either buy new machines outright or rent them from machine suppliers. Simply put, companies needed to consider whether to buy or rent a new machine to meet production demands in the short or long term. Outsourcing machines occurred in the garment industry, where some garment factories are short-lived or subcontractors, and the installation of new, advanced machines is highly expensive. By contrast, food processing and E&E companies would buy or invest in new machines or technologies that met production demands, as they were set to operate in Cambodia for a long time. The following respondents explained the factors and consideration behind machine replacement in their companies.

> So, usually, after a lot of use over a long time, machines wear out. Therefore, we need new and more modern machines to make better products. In the past, we did not have robots (automated machines), but now it is hard to rely on manual labour which sometimes can cause problems, too. (CE5913F pro)

> We have replaced some machines, actually. For example, if the machines that we rent are old or broken, we will rent or buy new machines. (CGBC830 hr)

> Yes, we don't buy certain machines for some fashions because they are so expensive. One costs up to 20,000 dollars, and it works on some modes only. Therefore, when we need to make this certain mode, we'll hire a machine from others, but we have people who know how to use that machine. (CGBBEBC pro)

Another reason behind machine replacement in some food processing, E&E and garment companies was the desire to cut expenditure on repairing old machines and improve productivity, while reducing damages or losses through technology investments. One major factor that led to new production technology requirements was the demand to improve quality and increase quantity. To fulfil orders for large quantities of products at a time, a company might need additional production machines; whereas to meet buyers' demands for higher quality products, a company might need new machines with advanced technologies. This change factor was mentioned by respondents across all three sectors:

> According to top management, the company wanted to make direct savings and reduce costs by minimising losses. So, they invested in new technology to reduce damage. (CFE45EE pro)

> When the demands from buyers increase, our factory will install new machines to meet their orders. …there will be some changes, depending on what buyers order – new circuits may be needed, depending on the machinery they want to install. …For internal factors, product quality is key. If product quality is good, there is less waste and fewer problems in shipping products to customers. (CEB043 pro)

> We changed the management team. They thought that the old machines could not meet current demands. Those machines leaked engine oil, left black stains, and were also corroded. (CGBBEBC hr)

The demand for faster production was also reported to be a driver of transformation in production technology. Production speed was not only considered important for meeting quantity demands and quality standards, but also for reducing production defects and production costs, including labour costs. Moreover, as workers' salaries continue to increase, and workers across all sectors demand higher pay, companies in the studied sectors have considered introducing new, advanced production technologies to offset wage hikes. This introduction of new machines or technologies was, while in line with the product orders and buyers' demand, a strategic investment for profit maximisation as the salaries of most employees rose continually, as depicted by the respondents from two food processing companies:

> When installing new machines, we consider speed and time. We used four machines before and now use only three. We usually consider costs. The new ones are more expensive than the old ones, but they make production easier because we need only three machines and they are faster, meaning we can work faster, save time and reduce defects. (CFE45EE hr)

> It's a win-win strategy for both the company and the employees. Employees contribute to increased profits and they also gain more benefits. So, they are highly motivated to work, and every day we are like one family. If we lose, we lose together; and if we profit, they will also receive incentives through the system we have. (CF10395 pro)

While many interviewed companies had considered adopting advanced production machinery, one respondent from an old, large garment factory in Phnom Penh reported that her boss did not intend to use modern sewing machines because he would rather provide more jobs for his employees. It could be that this company was able to afford to pay its employees higher wages in the knowledge that its productivity would remain strong due to employees' skills and experience. However, this company's stance was unique while many other companies did not reject the idea of introducing new technologies and machines when necessary. As one respondent said:

> In fact, our boss/owner is a bit old fashioned. He doesn't bring in new technology. He's more conservative and family style. He only uses old models. Automatic machines will increase production speed, but he doesn't think like that. He chooses normal machines. (CG16903 hr)

Most respondents reported that their companies had undertaken changes in work organisation, though a few did not mention any specific changes. In harmony with changes in production technology and products, work organisation was altered or improved to meet changing production demands in terms of quality, quantity, and productivity as a whole. New work arrangements were made or job responsibilities were assigned accordingly. When a new production line is installed, a group of operators is required to run it. Alternatively, it could happen that additional workers are deployed to existing production lines, increasing the responsibilities of line leaders and supervisors. It could also be that new work organisation due to technology upgrading or reform of workload and job responsibilities might reduce the number of production line workers, leading to better work performance. The human resources respondents from two E&E companies and a food processing company described what and how changes in work organisation occurred.

> With these changes we now have an improvement strategy called kaizen [improvement]. For example, one line consists of five people, so we have kaizen of two people [removed two people from one line], and three are the remaining. (CE1BD4F hr)

> With regard to work organisation, the management of human resources is a case in point. In the past we needed many employees and we spent a lot of time training them. But now that we use automated machinery, we do not need as much time and resources to manage and train employees. We have switched from using five people to using only one person to operate a machine. We also have the benefit of reducing training needs and the time and other resources needed to rectify mistakes. (CE4771 hr)

> As I said, it's related to productivity. For example, they used to make 600 cases a day before and now they can produce 6,000 cases a day. We set a target for them. We changed the way we work. We still make the same product. But now that we've identified our production weaknesses and hold ups, we can work faster. (CF10395 hr)

As the number of machines increased, new working arrangements were made to match production line changes. Additional machines or employees were required as companies received more orders, increasing production quantities. In turn, as production expanded, workloads and job responsibilities also increased, which led to the creation of new positions. Furthermore, the transfer of responsibility from one team to another meant that the employees with increased responsibility would have heavier workloads, allowing the remaining employees to work on other tasks with more focus. The following interview excerpts reveal how changes to work organisation were made in order to meet production targets.

> From smaller to bigger changes, for example, in the past, we had no supervisor or manager positions, we had only leaders. Above the leaders was the factory manager, who has managed everything in the factory for the last few years. When he saw that the leaders had management competencies and skills, promotion became possible; for example, we had only three lines before and now we have nine. (CGBC830 hr)

> For example, in single-needle machine lines, in the past we had 10, and now we have 20 people. Because we have more orders, we increased the number of machinists to 20 so as to speed up production and meet demand. We have also increased the number of overlocking machines from one to two. In general, each line has changed to include more people or more machines. (CG16903 hr)

> In the past we had quality controllers, but now we allow team leaders to have more responsibility for ensuring quality standards. So, we use quality controllers for other tasks, though they are still responsible for quality control. Instead of having three quality controllers, each line now has just one. (CFE45EE hr)

### *6.2.2 Transformation and its implications for skills*

Transformation in production technology, products and work organisation took place in a variety of forms in the interviewed companies, and is believed to be intertwined with human capital, specifically the skills and knowledge of employees. The direction of the relationship between transformation and skills is not clear, because it is difficult to identify whether employees' skills and knowledge enable transformation or vice versa. In other words, it may be that changes in production technology, products and work organisation require a certain set of new or additional skills and knowledge, or that having a certain skillset allows for or even drives transformation. The following sections illustrate employers' perceptions of the linkages between transformation and skills.

*(1) Technology change and its implications for skills*

Changes in technology were linked to the skills and knowledge of employees regardless of company type. The linkages between technology changes and skills included labour reduction, costs reduction, skills improvement, product quality improvement, quantity increases, wage hike, and skills requirements. For this study, almost all respondents viewed employees with TVET qualifications positively in terms of facilitating changes in technology. Based on our Likert scale data, they agreed that high- and mid-level employees with TVET qualifications would adapt faster to new technology, while in practice most companies did not value TVET qualifications when recruiting or promoting employees. That said, not all the interviewed companies directly reported their changes in production technologies, and not all changes in technology led to new or additional skills and knowledge of the employees. Moreover, technological transformation was different from one company to another, depending on their type, size, ownership or location.

Several E&E and food processing companies reported that the introduction of new, advanced technologies or machines helped reduce the number of production line workers, while most garment companies did not mention anything about labour reduction. One crucial implication of this transformation in production technology in relation to skills utilisation is that in some companies manual work or labour was replaced with new or advanced fully or semi-automated machines, allowing those companies to allocate their leftover employees and resources for other tasks. However, not all of those newly installed machines were completely free of human supervision or operation. In all sectors, most manual workers or operators were affected by

or had a lower manual workload due to technological changes in production processes, while high-skilled employees were less affected. For example, the production respondents from CE1BD4F and CGF21EF expressed their perceptions of labour reduction in relation to new machinery in their company production lines.

> In the past, we had to have someone overseeing the cable cutting machine all the time after we input the setting. Now, we don't need to have someone overseeing it. We have an automated machine and all we have to do is collect the finished goods. For other machines, we don't even need human operators anymore. (CE1BD4F pro)

> We still need humans, but the number is reduced. (CGF21EF pro)

In general, upgrading technology or machines helped companies reduce the number of manual operators or employees on production lines, but that does not mean the total number of employees in those companies decreased. Companies directed those employees to other roles, or sometimes used them to replace employees who had resigned, as recruiting new employees with the same practical skills and experience is not that easy for most companies. Take, for example, company CFE45EE, where technological change took place, the number of employees remained the same, but losses related to defects and waste were reduced, so the company was able to efficiently use its employees and other resources to improve production. In another example, machine upgrading in company CE5913F reduced the workload of production line operators, and the leftover employees from the production section were assigned other tasks. As such, the installation of automated machines not only helped reduce manual labour, but also improved the quality and quantity of products. Probably, relying on manual work alone would not meet customers' demands or achieve the desired quality, so the introduction of advanced technologies helped optimise production quality and quantity and also increased company growth, as indicated by the following respondents.

> In fact, we use the same number of employees, but our machines are better. We have reduced the number of defects. The old machines continued packing when there were no crackers to pack, so they wasted plastic packaging. When we now use this new technology, with the same number of employees, the machines do not waste packaging. We have reduced wastage. (CFE45EE)

> No, robots were installed to reduce employees' workloads. We did not reduce the number of operators. For instance, in the past we needed two operators per machine, but automated machines reduced the workload and we can use one operator to do something else. We did not lay anyone off. (CE5913F pro)

> I want to say that quality and quantity have improved since we switched from manual work to using technology. (CE4771 hr)

While technology upgrading was reported as a main reason for reducing labour and costs in some interviewed companies, the installation of new or additional machines did not reduce the number of production line workers as those companies needed workers to operate the new machines in order to fulfil orders. In a few cases, this type of change in technology even led to the recruitment of new employees, or required additional employees in production as a means to cope with more orders or to meet deadlines. For example, the human resources respondent from company CF3 reported that the change/machine update would require the company to hire more employees and machine operators. Similarly, the human resources respondent from company CEB043 stated that adding new machines would increase the number of employees in

a technical team. Sometimes the companies recruited new employees to operate new machines, while they also reserved some employees to cover resignations due to production complexity or difficulties, as in the case of company CE166E20.

> Yes. It was a bit advantage for that change or update, which means we had to recruit more employees and more machine operators. (CF3 hr)

> It has some connection, meaning that if we add a new machine, we need to have two people in the new technology team, but not reduction [the number of employees increases]. (CEB043 hr)

> Yes, we recruited new employees to operate new machines. Sometimes new employees quit the job after one or two days. (CE166E20 pro)

Only a few companies said they recruited more employees for new machines or new production lines. Most companies relied on their existing workforce and did not hire new or extra employees for new machines or technology upgrading. Instead, most of them seemed to rely on machine experts from outside the company when they upgraded or changed their technology. Based on the perspectives of some E&E and garment companies, it seems that modern technology was used to smooth production processes and demand, and that this also led to the skills and knowledge improvement of existing employees. The respondents from companies CE5913F and CG1099F explained how technology upgrading linked with skills utilisation:

> There was no complication because modern technology makes things more convenient. (CE5913F hr)

> As I said earlier, it was not affected like that. The company brought new technology to smooth production. It was the buyers' suggestion. …It didn't require many changes or skills… (CG1099F hr)

In general, the introduction of new, advanced technologies depends on the stock of relevant expertise available in a company. In practice, however, most of the interviewed companies adopted advanced machines or technologies but did not rely much on their employees' skills and experience. Moreover, they did not recruit local employees with new skillsets or TVET qualifications even though they did not have any internal expertise for those new technologies. Instead, they received or relied heavily on technical support or expertise from their machine suppliers and overseas branches. As the respondents of CGBC830 and CE5913F said, their companies were dependent on outside specialists or technical experts from abroad if any technology changes occurred, except for a few cases in which the respondents mentioned that their companies considered the skills and knowledge of their existing employees before introducing any major changes in production technology.

> We did not recruit a new operator because if we bought a new machine, the machine company would provide us with its own specialist to train us. (CGBC830 pro)

> We considered our internal human resources before we introduced new technology. (CF3 hr)

> Normally, we need to examine a new project, product or machine, whether it really requires a new skill that we do not already have. In general, we prioritise our workers because they know the basics and try to fill any skill that they do not have by bringing in expert trainers from Japan, Thailand or China. Therefore, any new skills will be built on the basic skills of our employees. (CE4771 pro)

Unlike most companies, a garment factory in Preah Sihanouk did introduce a small number of advanced machines with good or outstanding employees who were able to learn. The respondent from that company said they were allowed to use those machines for a certain time to observe their performance before installing more machines. The existing skills and experience of the employees smoothed the introduction of new technology. Using this approach, the company was able to avoid production interruptions while transitioning from old to new machines.

> Before we ordered the new machines, we had to learn about them first. We brought five or six new machines to test. After getting to know them well, we ordered the new machines. We cannot order new machines without studying [how to use them] first because it could affect production. (CG1099F hr)

When the installation of new machines happened or was planned, companies did not require their existing employees to have a completely new skillset as they could rely on technical and human resource support from their parent companies abroad. Therefore, most employers did not worry about new skillsets or new skilled employees when introducing technology upgrading in Cambodia, as expressed by E&E and food processing respondents:

> In general, when it comes to putting in new machines, Thai specialists set them up for us. (CE166E20 hr)

> It's quite difficult because when a machine needs repairing, we have to ask Thai employees to help us. We can resolve some small errors ourselves. If we face a huge problem, we need to shut down the machine and [production] line. (CE166E20 pro)

> And the installation also needed more specialists to set up the modern machines, as [our] skilled workers could not do it. That is why we had to hire specialists from Taiwan to train our employees. (CF3 hr)

Moreover, most of the respondents stressed the importance of the practical skills and experience of their current employees in relation to transformation in production technology. The skills and knowledge required by technology upgrading were not much different from the previous ones, or were simply built on the existing skills and experience of employees, so new employees with new or additional skillsets were not required as most companies could deal with the matter internally. More importantly, technology upgrading was used for improving production lines, thus reducing operational difficulty and workload in terms of manual work. Specifically, in most garment companies, employees were very familiar with sewing machines because they had worked in the sector for a long time, so could draw on their practical skills and experience when changes occurred.

> They didn't require much change or skills. We just need to train our workers. (CG1099F hr)

One stand-out finding is that most technological changes in the interviewed companies were smoothed by specialists or experts from parent companies abroad or from machine suppliers. This suggests that the roles of internal technicians, mechanics and engineers were not that important for technology upgrading. Instead, the companies were merely followers or recipients of skills and knowledge transferred to them by outside experts, and that those transferred skills and knowledge were usually limited or operations-related. The skills and knowledge related to operation and safety were transferred to operators by technicians, mechanics and engineers through peer learning or on-the-job training.

> No, I don't think so. Technicians from abroad came to teach us for a while, until we knew everything there was to know about the new machines. (CE5913F hr)

> No, because our supplier would be responsible for installment [of the machine] and training on its use and setup and then hand over to our employees. (CE5913F pro)

> And the installation also needed more specialists to install modern machines, while skilled workers could not do it. That was why we had to hire specialists from Taiwan to train our employees. (CF3 hr)

The companies that reported technology changes in production also stated that those changes had implications for the skills and knowledge of existing employees. It could be that the employees had to update their skills and knowledge in relation to the unknown or unfamiliar areas created by those changes. Although almost none of the interviewed companies said anything about the introduction of new technologies requiring employees to acquire new or additional skillsets from the outset, they did point out that changes in technology could eventually lead to new skills and knowledge. For example, in practice, employees learned new skills or knowledge through working with their peers or operational processes when new machines were adopted. Thus, to some degree, changes in production technology had an impact on existing skills and knowledge, and employees had no option other than to adjust to those changes as required. The skills improvement of employees at all occupational levels was key to the smooth introduction of new machines or technology, and those employees who were not able to meet the new skills requirements faced difficulty, as indicated by some E&E respondents.

> I was talking about how the new technology affects us. If we look at our employees, 100 percent of them have improved their skills. Second, there are improvements in their ability to adapt to change. It has affected job resignations. In the past, we had more resignations regardless of lower or higher positions because they could not adapt to new situations. (CE4771 hr)

> Our skills have improved to meet the requirements of new products and technologies. As such our skills are better. (CE4771 pro)

> Normally, we have the ones with the most experience here. New machines are not necessarily completely new. There are both new functions and similarities with the old machine. All we need to do is train the workers on some of the new functions. It's not something entirely new. (CE1BD4F pro)

In the food processing sector, respondents indicated that the introduction of new machines meant their companies had to improve the skills and competencies of the workforce, not only to ensure that employees could operate the machines, but also to produce better quality products and increase productivity. In short, they needed to upskill their workforce in order to get the most out of their investments in technology. In general, technicians and mechanics encountered more difficulties than operators when getting to grips with completely new machines or technology, so they needed time to learn and observe. The same was true for the other sectors. In the words of two respondents from a food processing factory in Phnom Penh:

> Yes, we need [to improve workforce skills]. First, the current workers need to improve their knowledge. Second, normally, when we have better machines, our work is faster, so we need to improve our competence to meet the [goals of our] investment. (CFE45EE hr)

> Technicians had difficulties. When the new machine was introduced, technicians never saw it in operation. When it broke down, it took them a long time to do some research and repair it. (CFE45EE pro)

In the garment sector, new modern semi-automated machines required additional skills and knowledge. However, the operators in most garment companies faced few or no problems operating those new machines as they had worked in the sector for years and used various types of machines. Because they already had relevant practical skills and knowledge, and because the new machines were not completely different, the operators were able to learn and adapt quickly. As the respondents from CG16903 and CGF21EF pointed out:

> Yes, it [skills and knowledge] increases. Their skills become even better after inspection. Better and faster. …Yes. Even if they are new [to machines], it only takes them two months to become good. (CG16903 hr)

> They seem to have gained more skills. They used to operate simple, manual ironing machines, but when they started using the advanced machines, their skills seemed to increase. They could operate the machines very well. …When they ran into difficulties, the company did not pressure them. They usually needed two or three days to learn. So, we didn't force them to be good quickly, but we let them learn and adapt accordingly. (CGF21EF pro)

Garment sector workers resisted change because having worked in the sector for many years they were familiar with the old ways of operating. Companies sometimes had to force their workers to use new, advanced machines. Besides their clothes styles experience and sewing machine skills, the employees needed to be able to use the advanced machinery to improve product quality and quantity, as shown in the words of the respondent from CGBBEBC:

> We had it [new machinery] but the employees didn't use it. I mean we needed to change the mindsets of the machinists. This factory has been operating for years, but we hadn't changed the machines. Although we had new machines, they weren't being used and were left unopened. These days, we force them to use the new machines. …It depends on the changes of models. When there are more models, we will develop and change the machines accordingly. (CGBBEBC pro)

*(2) Product change and its implications for skills*

New product orders that came with adjustments or higher quality requirements left producers no choice but to change their production processes accordingly. The companies affected by major adjustments to purchase orders reported that new or adjusted product types and processes changed the types and volumes of skills they required. These companies each experienced a different level of product change, however. Some had to make a completely new product type that required their employees to have specific skills and knowledge, whereas others had only to make slight changes to their products. To meet product change requirements, companies required employees to adapt their skills and experience and/or upskilled or reskilled their workforce. Additional skills were needed for product changes, but not all product changes required a complete change in employees' skillsets.

Having a high number of mid- and high-level employees with TVET qualifications helped smooth the introduction of new products, according to most respondents (based on our Likert scale data). This suggests that higher levels of TVET equip the labour force with the skills

needed for product adoption. However, only the E&E companies had many employees with TVET qualifications, whereas most of those in the other sectors did not. In fact, it seems that the garment companies did not require employees with higher TVET qualifications for their product changes. For E&E companies, employees' skills and knowledge changed depending on product type, meaning that new product types resulted in changes in existing skills and competencies. Employees' skills and knowledge were gradually improved over time through the work process, as explained by the respondents from CE166E20 and CE4771.

> Skills have to change because of new products; we have to change skills; we can't do the same. We use the same staff but teach them new skills. (CE166E20 hr)

> Our skills have improved to meet the requirements of new products and technologies. As such, our skills have become better. (CE4771 pro)

Improving the skills of E&E employees when producing new or modified products was challenging because those product types sometimes required higher skill levels and better knowledge. Employees, especially less-educated operators, often faced difficulty making those products, that is until they had completely adapted to the new product types. With the production of new product types, employees eventually improved their skills and knowledge, which meant they could work on various product types. Thus, the introduction of new product types and technology allowed existing employees to gain specific skillsets and improve their overall skills and knowledge. As a result, the current skills and experience of employees should be considered when launching new product types. The following statements from E&E company representatives explain employees' skills improvement.

> The difficulties are employees' lack of experience and sometimes production is less than before, so it's not easy when we [implement] change; it brings a lot of problems. (CEB043 hr)

> It means that employees who used to work on one product can now work on another. … Second, sometimes a customer requires the products to be manufactured by employees with a certain skill level. …We screened the employees to find those with high-level skills and let them work on the new products. (CE4771 hr)

> For example, we need to put a lot a lot of thought into the introduction of new products. Now let me talk about the engineer and technicians. After some consideration, the engineer can make an inspection board and draw the layout, whereas technicians only do repair work. (CE1BD4F hr)

Food processing companies also reported that product changes caused difficulties for production employees in terms of complexity and workload. Even so, their employees could adapt to those changes over time with support from higher-level employees (e.g. supervisors and leaders) who had practical skills and experience. Additional skills and knowledge were always needed for new product types. For example, in companies CFC0BB6 and CFE45EE, employees gained skills and experience from making new product types. Operators learned new techniques to operate machines or to increase product quality. Making high-quality confectionary, for instance, was difficult for many employees because they were not familiar with this production type. Over time, with the skills transfer and practical training from experts and technicians, the employees could learn and perform better due to their increased skills, knowledge and experience with the products.

> Adding more products created some difficulties for production employees because they had to change [the way they worked] accordingly, for example, they had to change packs, speed, and heat. Packaging employees also faced some difficulties because they had to pack more product types than before. (CFE45EE hr)

> Skills have improved through a lot of skills training, with [workers] gaining more experience and making good quality products. …The first thing was that they learned about new products. When we have a new product, the production process is also different, like what should the temperature be? How does the vacuum sealer work? What percentage of oil should be used? Can it break? What is the correct moisture level? Employees need to learn about the process for new products. They gain new experience. The challenge is that producing a new product is a bit tiring until production issues have been smoothed. (CFC0BB6 hr)

Overcoming language barriers that could prevent skills and knowledge transfer from foreign experts and technicians who took a role in training employees and leading new product introduction processes was one of the main challenges in skills upgrading. As most interviewed companies relied on foreign experts and technicians, transferring production skills could be problematic. Production workers, due to their low educational attainment, have poor language proficiency in Khmer sometimes, let alone in foreign languages, making it hard for them to follow the skills training delivered by those foreigners, as in the case of E&E company CE4771.

> Another factor is the language barrier when those experts come in. For example, we have Japanese experts coming in, but their English is not fluent, and nor is ours. They are good at technology and skills, but the language barrier makes communication difficult and authentic meaning is lost, particularly in training. (CE4771 pro)

Garment companies also reported that their employees had to improve their skills and knowledge to meet the complexity of new styles or fashions. However, those changes were manageable for the employees because they had developed their sewing skills using various machines and amassed work experience in producing diverse styles of clothing. Additionally, the new styles were not much different. Workers improved their skills and then they were able to produce good quality products. Two garment company respondents described how their employees learned and improved their skills and competencies over time:

> … it means that the clothes quality has improved. Buyers used to complain but now it is better. Ninety in every 100 garments are of good quality compared to only 50 in the past. He [the boss] expects the company to improve further in quality… Employees have made products of many different designs, though it is not a challenging one. In addition, the company's summary report indicates improvement in employees' skills. (CG16903 pro)

> At the start, it [product change] normally affects their skills. For example, the employees are reluctant to sew, but after one to two weeks, they become familiar [with the new style] and faster. Actually, they do not have to spend time learning new styles because they are skilled, but they still need one or two weeks to learn before they can get production up to speed when familiar with the styles. …Normally, we are familiar with the styles we make every day, but when it comes to new styles, we have to think about how to make them. (CGBC830 hr)

According to some long-established garment companies, the skills and work experience of their employees have improved over time, even though they have employed many workers

with low education and skills since the beginning. This could be because those companies invested time and resources in employee training when they first began operating in Cambodia. This shows how low-skilled workers have learned and improved their skills and competencies through on-the-job training, as the human resources respondent from CGBC830 expressed:

> In the past, we hired low-skilled people to work. But now their skills are largely improved and easily managed. For example, employees used to produce only 3,000 pieces a month but now they can produce more than 10,000 pieces a month. (CGBC830 hr)

In most garment companies, higher-level employees, including (foreign) supervisors and some leaders, were the key enablers of product change. They were at the forefront of testing products or making samples with guidance from experts or machine technicians, and they made sure their teams knew what the product should look like and what the quality should be. Therefore, product changes were possible due to the practical skills, knowledge and experience of those supervisors and leaders as a front-line force. This also shows that most garment companies did not recruit supervisors or leaders from outside when introducing new products, as their internal employees could deal with the changes. The following comments from garment company representatives show the key role and responsibilities of the supervisors and team leaders in leading product changes, and that new employees in higher positions are not usually required in most companies.

> Another thing is that our Chinese employees in the production team already know how to use those machines. Therefore, when our employees don't know something, they can ask the Chinese employees with assistance of an interpreter. (CGBBEBC pro)

> We let the workers with sewing skills operate the new machine first. Also, there isn't a huge change between the old and new machine. … If they cannot do it, we have a specialist from the machine manufacturer or Chinese employees to train them. (CGSZYY pro)

> No, we do not need any other skills. … If they have that education or practical skills, we will receive an order of complex products because the employees are skillful. …We need to call on our mechanic to learn from the specialists of the company [we bought the machines from] in order to learn and understand machine operations and techniques. But if it is the same machine, we do not need to train them [the machinists] because they already have the skills. (CGBC830 pro)

*(3) Work organisation change and its implications for skills*

Changes in work organisation are usually related to changes in production technology and products as all production arrangements complement one another in response to company goals and customer demands. In this study, as work and tasks were re-organised to meet those needs, changes were related to the skills, knowledge and experience of existing production employees. For example, work organisation changes were related to technology upgrading or product change, so the existing employees with certain skillsets and experiences were also affected if they were involved in that change process. When grappling with changes in technology and products, companies optimised their production and work arrangements using existing resources and employees as much as possible. As our Likert scale data showed, respondents agreed that employees with high- and mid-level TVET qualifications are likely to adapt to work organisation changes faster than those without formal skills training.

Work organisation change led to an improvement in skills use given that the number of employees in each production line could be reduced. To put it simply, workloads and responsibilities were

increased at each workstation. When new advanced machines were introduced, production line workers were required to gain new skills and knowledge to operate them and any left-over workers were moved to another task. This work re-organisation helped reduce the number of workers per production line. In tandem with this labour reduction, the workload of higher-level employees increased, also a result of changes in the work process. For example, one respondent from E&E company CE5913F said that the installation of more machines had increased the workloads of technicians and mechanics. Two respondents from food processing companies CF248C and CFE45EE described how work re-organisation contributed to work improvement:

> Yes. There were changes in organisation in each section. In the past, we used at least eight operators for a line. It could be up to 20 operators. But now, each line has at most five operators. …This means that their [mechanics and technicians] workload such as checking and monitoring is greater. They have to check more machines. Even though we did not need that many more employees, we had more machines. (CE5913F hr)

> If there's a lot of new products coming in, we have to have a change in work organisation. We have to move workers from one place to another. For example, before we used to have six workers working. Then, we could pull out two people to do other newer jobs. It can change. (CF248C hr)

> In the past we had quality controllers but now we have reduced their role in order to allow team leaders to have more responsibility, so we use them for other tasks, but they are still responsible for quality control. It means that each line used to have three quality controllers but now has one. We have reduced [the number of production line quality controllers]. (CFE45EE hr)

In the garment sector, some companies re-arranged or created new high-level positions, such as production line supervisors, to manage and support line leaders and operators because their products were always changing and orders were increasing. These leaders and supervisors were needed to ensure production workflows. The larger number of employees in each line required more responsibilities and management from the leaders and supervisors. A major change was the transfer of leadership and management positions from foreign to high-level Cambodian employees. This demonstrated that Cambodian employees had gained and improved their practical skills and experience in leadership and management. The Cambodian supervisors were able to communicate well with line operators and other workers. The human resources respondents from garment companies CGBC830 and CG16903 explained the changes in work organisation resulting from product and order changes, especially those leading to changes in the work and responsibilities of frontline supervisors and production line leaders.

> Our products always change, and we also have many buyers (about 4 to10), so we have many products. Therefore, one leader was not enough to manage 40 people, and the result was not good at all. This required supervisors to help oversee three lines each (about 100 people) in order to ensure workflows and prevent any problems. (CGBC830 hr)

> There are not many mistakes or defects. We have reduced them by a lot. Instead, we have actually gained a lot of benefits from replacing Chinese employees with Cambodian employees. There are changes. There are more opportunities for Cambodian employees, more than for Chinese employees. Now, there are Cambodian supervisors. They have the same management as Chinese employees. So, we do not have to worry about quotas. We have provided more opportunities for Cambodian employees. (CG16903 hr)

In E&E companies, changes in work organisation also contributed to reducing employee resignations and increasing employee productivity and skills. New working arrangements with automated machines was important for saving time and resources in production. Likewise, in food processing companies, new working arrangements led to improvements in employee work performance due to the more efficient use of employees in production, as pointed out by the following respondents.

> Since we implemented changes in work organisation, employee resignations have gone down. This reduction in resignations results from the changes. Even the productivity of the employees has increased, meaning that their skills have increased. And they rarely take leave, which is another productivity improvement. (CE4771 hr)

> Another thing is that the efficiency of our workers has increased so many times. I can say that it has increased by three times for some sections and by seven to eight times for other sections. Those are changes. (CF10395 pro)

> We have those kinds of change. Now that there are more products, the task that used to be done by five workers is done by only four workers. We reassigned the leftover workers to, say stock control. However, during this last month, we didn't have much work because the stock is full in Japan. However, over the last three years, the work has increased. (CF248C pro)

Work arrangement changes, such as removing or adding more people to the production lines, also relied on the skills and knowledge of the operators. Some companies also arranged tasks and roles for their employees depending on the work and production requirements. Operators were not removed from production lines until employees had gained the skills and knowledge needed for the new work organisation. Additionally, the companies would consider the employees' skills and then assign tasks or roles accordingly. Sometimes, production work required employees with management skills to lead or control the production lines or processes. The respondents from the following E&E companies pointed out the linkage between workers' skills and knowledge and the possibilities for new work arrangements in production.

> Yes, if they have certain skills, we can start earlier or after half a year, then we can take them [line workers] out to make the quality consistent because at their level they cannot complete tasks 100%. Therefore, we need to increase the number of workers to reach standard, but if there is a surplus, we will take them out. …It involves with work requirements; if we have workers with high skills, we'll find it easier to work. Therefore, it means that if normally we need five people, we can assign only three. (CEB043 hr)

> It depends on the level of skill in reality. For example, before, four people used to work on a particular task, but now we'll discuss with those four people to see who can take over this task. Then we'll assign tasks accordingly and decide who will work on what. (CEB043 pro)

> ...since our production needs someone with skills to manage it, we need those who are capable of doing this job, and we'll select someone who has the ability to be team leader or production leader. (CE518AD hr)

In some companies, it was important to have contingent workers as some high- or mid-level employees might take leave or quit their job so quickly that production could stop unexpectedly. Arranged in this way, any employees with the required skills and knowledge could take over those positions and lead the production lines when needed. This work arrangement happened across the sectors as companies prepared for skills transfer and work rotation. However, such task or workstation rotation most often happened in garment companies with more experienced,

skilled operators and leaders who could perform multiple tasks and work roles on the production line. This style of work arrangement was possible because most garment operators and leaders had worked in this sector for many years, and they were familiar with a wide range of clothes fashions and styles. In contrast, operators and other employees in E&E and food processing companies were rather new to the work and production processes, meaning it took time and effort for them to learn how to rotate production line tasks and work roles. As in the words of the following respondents from the food and garment companies:

> There are [changes]. We organised a (inc.) [reserved skilled person] for each production line. Therefore, we have a next-in-line in case anything happens. For example, if the higher ups are busy, they can have the next one down to replace them. Each team and each line have to arrange in that way. (CF125571 hr)

> When some employees finished their task, they had nothing else to do. When someone resigned, there were fewer employees, so those who were free could replace the previous employee and continue working, preventing them from being idle at work. In the past, some employees who finished their parts would be free having nothing else to do, but now they work non-stop. (CGF21EF pro)

> They [existing employees] are still there. We just changed the machines. We have the same people. Some workers know how to sew pockets and also other parts of the clothes. So, when the pocket sewing line is free, those workers can go to help with other parts. (CG1099F hr)

Most work arrangements had, more or less, an impact on the employees involved in the work process. Those employees were encouraged to adapt their skills and responsibilities accordingly. Moreover, it took time and effort for them to adjust and learn new aspects of production. Flexibility in work roles and responsibilities was important in all aspects of work organisation, though some employees had difficulties with such changes at first. The following respondents from CF3 and CFE45EE (food processing firms) indicated how companies worked with employees to change their skills and work responsibilities.

> I think that nothing has been affected, because we are not forcing them to do two jobs at the same time. It means if we work on the freshwater production line, we suspend the milk production line, so their work is not much different from before. The only difference is the packaging style of the products. (CF3 pro)

> When we had changes like this, we required them to learn more. (CFE45EE hr)

In the garment sector, new work arrangements were eased by incentive or bonus provision for operators and other employees. Aided by incentive schemes and target setting, new working arrangements helped improve employees' performance, leading to productivity growth, skills upgrading, and mindset change in many garment companies. As many respondents illustrated in the interviews, when new machines or new unfamiliar products were introduced, employees would fear losing any benefits because they might not be able to meet the same quality and quantity standards as they used to when producing the old product types on the old machines with which they were very familiar. The introduction of incentive or bonus systems for production employees was a very practical arrangement that allowed operators and leaders to work towards beating the targets set by companies. Then, the quality and quantity of products were ensured, as shown in the words of the respondents from two garment companies:

> There are always some problems. For example, during the introduction of new styles, they were not able to sew as many as possible. So, they requested a higher price for their outputs, due to difficulty in sewing. (CGF21EF hr)

> We produced smaller quantities before. Then, the management motivated the employees through a monetary bonus (reward) system, which earned them a lot of benefits and changed their sewing habits. Before the implementation of the bonus system, we produced about 4,000 to 5,000 shirts per group, but after we implemented the bonus system, we were easily able to produce 6,000 to 7,000 pieces of any style per group. (CGF21EF pro)

> They do not work their best when a new machine is installed, but wait for the target to be set first. That's why most of the factories set targets: what level to reach and by which date, and how much to achieve. It would not be better if we just allow them to work in their own way. (CGBBEBC pro)

The incentive or reward system was an important stimulus to motivate all employees to work as well as possible in order to meet targets in exchange for a monetary bonus. In fact, this practice was applied across all three sectors, where product quality and quantity were the ultimate goals of the companies and buyers. Another aspect of this system is that it also created competition among the employees wanting to produce the largest number of products. For example, to make the production environment more productive and challenging, one garment company installed an information board showing the numbers of products that each group of employees had made, which helped encourage all the employees to work harder.

> We have a notice board. The workers always used to ask their team leader about their finished quantity. Now, they only have to walk over there to see how many they have made, without having to ask their leader to calculate their tasks. (CGF21EF pro)

### 6.3 Strategies for overcoming skills challenges posed by transformation

As most interviewed companies reported, when any form of transformation happened or was required by production, all processes and employees were also involved in that transformation. The changes in technology, products and work organisation also had a certain linkage with employees' skills and knowledge. Either transformation required a certain skillset, or certain skillsets might lead to a certain type of transformation. Moreover, transformation posed certain problems and challenges regarding the skills and knowledge of the employees involved. As a result, most companies used different strategies or methods when dealing with those skills problems and challenges, as described in the next section.

A crucial solution to skills problems was to outsource experts from headquarters or machine suppliers. This method was commonly used by all companies in the study, where the skills and knowledge of their internal technicians and engineers could not match the transformation requirements. In the E&E sector, companies relied more on experts from overseas branches. Those experts came and helped prepare and install new machine systems or production processes. E&E products could be more complex and newer than those in the other two sectors. Thus, outsourcing experts and technicians was the best option for E&E companies.

> In general, when it comes to putting in new machines, Thai specialists set them up for us. (CE166E20 hr)

> It's quite difficult because when a machine needs to be repaired, we have to request Thai employees to help us. We can fix some small errors ourselves. If we face a huge problem, we need to shut down the machine and line. (CE166E20 pro)

> Yes, when there are changes, …[we] invite trainers from abroad to train them. (CE4771 hr)

Similarly, food processing companies introduced new technologies with the assistance of machine suppliers who provided technical and mechanical experts to help set up machine systems and processes. The food processing machines were often large and complex, so the Cambodian technicians and mechanics in general could not set them up without help. Apart from installation, food processing companies relied on their machine suppliers for other after-sales services such as maintenance and repair services.

> It was difficult. We had to call in the machine specialist to train our operators or supervisors or manager about how to use the machine. In some cases, we cannot use a machine immediately after we have installed it as we have to alter it in some way. For example, we have to adjust the box-folding machine to suit our product. (CF125571 hr)

> It was the machine seller who sent the trainer to teach us how to operate the machines, but they didn't teach us how to repair them because the machines are new and have no problems. (CFE45EE pro)

Although garment companies relied on outside technicians and experts to install and set up new machines and production processes, they also had their foreign employees in charge of technology changes, especially in terms of testing and operating new machines as well as making new product samples. In order to make product samples, garment companies also obtained technical support from their buyers in helping and training supervisors and leaders. If only a slight change in product types was required, the supervisors and leaders could manage and prepare for that change accordingly.

> Yes, we will have one person to introduce them to a machine so that they can learn more from this. (CGBBEBC pro)

> If there is a new or modern machine, we also need the technicians from that sales company to train us. (CGBC830 pro)

> Yes, when there is a new style ordered, because they are normally very familiar with the same old shirt styles, but if there is a new one that is difficult and complex, they need to learn from the Chinese. (CGF21EF pro)

As usual, transformation could have implications for the recruitment of new employees, or requirements for new, additional skillsets from current employees across the three sectors. However, as most companies in this study reported, the recruitment of new employees with new, additional skillsets was rare. For example, new, additional skillsets were not required to a large extent by many garment companies, although skills improvement or skills upgrading was required by some transformation types. The external resources on which most companies relied were technical experts and resources provided by their overseas headquarters or buyers as required. In this respect, the recruitment of new employees for new technology upgrading was less likely to happen because the preparation and setup of everything was the responsibility of the parent companies or the machine suppliers.

> We did not recruit a new one because if we bought a new machine, the machine company would provide us with its specialist to train us. (CGBC830 pro)

Current employees also played a role in making decisions about the introduction of new changes, although not many companies stressed this matter. The key point was that transferring skills and knowledge from outsiders to internal employees mattered the most in many companies. Without the appropriate skills and knowledge of existing employees, most of the transformation types could fail or would not be possible, which is why companies focused on transferring skills.

> There were some effects. However, when we introduce a new machine, we first test it alongside our old machine. However, we sometimes have problems transferring skilled employees to test the new machine. Therefore, it led to something of an employee shortage. (CF125571 hr)

As most companies relied on their current employees, internal promotion was often used as a replacement for the recruitment of new employees for transformation. Companies used this form of promotion as a way of encouraging their current employees, and as a way of reducing recruitment expenditures. Such internal promotion was based on work performance as well as practical skills and knowledge of the work and company.

> It means that we change depending on our employees. If he/she tries, there will be promotion opportunities when they develop new skills. (CFC0BB6 pro)

As part of the strategies, internal training and development (T&D) of operators and employees was crucially important to meet the skills requirements created by transformation within companies. Internal, informal T&D activities were largely and commonly found in all the companies across the sectors, while external formal and non-formal skills training was unlikely to happen in most companies, and especially in garment companies. Although some E&E companies found it important to send their technicians and engineers to participate in external training, most of the time that training was done internally in overseas branches, and no formal certification was given to participants. The internal training included learning through peer observation and shadowing, on-the-job training with guidance and practice, job orientation, and other operation-related training activities. Internal training was the main and often only source of employees' upskilling and reskilling.

> At the start, it can affect their skills normally. For example, the employees are reluctant to sew, but after one or two weeks, they become familiar and faster. Actually, the employees do not spend time learning new styles as they already have skills, but they still need one or two weeks to learn and familiarise themselves with the styles before they can speed up. (CGBC830 hr)

> It was quite difficult at first; for example, we were not able to change to the new taste. The production team was called up for training on the new formula, but at first they were not able to adapt to the new taste. (CFC0BB6 pro)

> They can perform better at work when we provide this kind of practical training. (CE518AD pro)

Internal T&D activities were pivotal to the skills development of all employees, and the key players in that skills transfer mechanism were the leaders and supervisors of the operators and general workers. The leaders and supervisors who had practical skills, knowledge and experience with their work process and production were central to transformation. They had a major role in transferring skills and knowledge to their peers and workers under their supervision and leadership. Although they trained their subordinates informally, the skills and knowledge transferred were practical and relevant to their company's production. Senior employees guided and instructed junior employees in new jobs or positions in production lines.

All the internal training offered by the leaders and supervisors was related to operation-specific skills and knowledge, while other generic skills training could be given by management and human resource staff. Besides their forefront roles in the skills transfer mechanism, most senior leaders and supervisors did not have any certified qualifications. This informal skills transfer was a crucial process in all companies, as shown in the following statements.

> We trained all of them and grouped them into different lines for the team leader to start operating those new lines. We could not have 20-30-40 operators for the team leader to train at one time. (CE1BD4F hr)

> They [machinists] have more responsibility. Since we divided them into single and twin-needle sewing-machines, we [they] will do what we instruct them. (CGSZYY pro)

> When we need to change any part of production, everyone involved in the change will have to participate in training. The factory manager leads that change and training, with support from the managers and supervisors. (CF3 hr)

## 7. Discussion

This section discusses the key findings of the study. The discussion covers employers' perceptions of the skills and qualifications of their current workforce and companies' experience and use of those skills and qualifications in their production; the linkage between skills and transformation in terms of changes in production technology, products and work organisation; and the strategies and methods commonly used in dealing with the skills challenges and problems posed by that transformation across the three sectors.

### 7.1 Employers' perceptions of skills and qualifications

Most companies reported that they experienced skills shortages and difficulties in recruiting high- and mid-level employees. The number of skilled employees or technicians with TVET qualifications in the labour market was relatively low, while the majority of graduates left university with general education in Cambodia. This could be a reason for the shortage of employees with TVET qualifications in most companies. The skilled labour shortage was even worse for companies in the provinces, where TVET schools are few and far between and the subjects taught and the number of enrolments are often limited.

The reported skills shortages could also be because the companies set high recruitment requirements for specific skills and knowledge that are very hard to find in the Cambodian labour market. Consequently, they found it difficult to recruit experienced employees with specific technical skills and qualifications. For general workers or operators, recruitment was not or less difficult because the companies did not require those workers to have any TVET qualifications; besides, the companies could train new employees to operate machines on site. However, when a large number of general workers was needed, labour shortage also occurred, especially in the provinces. Thus, skills shortage was a key challenge in employee recruitment and selection, as previous studies have pointed out (NEA 2018; EMC 2014; HRINC 2010; Ven and Veung 2020).

The poor quality of education and training and the yawning gaps in technical skills are persistent barriers to Cambodia's skills development (RGC 2015, 2017). These issues, the cause of longstanding complaints among many employers, are well documented (NEA 2018; HRINC 2010; Khieng, Madhur and Chhem 2015). In this study, the quality and level of education and training were generally low among the employees in the selected companies. Even though their

workforces were dominated by workers and operators with low (poor) education and training, most companies agreed that the employees with better education and training, regardless of general or technical types, could perform work to a better standard or develop skills quickly, whereas those with less or no education and training would need time and resources to learn and work effectively.

At the same time, most interviewed companies perceived skills training programs as less relevant to their skills needs. Besides, not many of those programs were available in the provinces. Particularly in the E&E and food processing sectors, companies held that the available skills training programs were incapable of meeting their expectations and requirements in general. Most companies required industry or company-specific skills and knowledge from their employees, whereas TVET qualifications and skills from school or university were generic and basic. One of the major challenges was that the facilities and equipment of TVET schools were less modern than those of the E&E and food processing companies. This clearly demonstrates that the skills and knowledge from those Cambodian TVET schools are less relevant to or cannot meet the production technologies and processes of the companies. Because of what they perceived to be deep-seated problems in Cambodia's education and training system, most interviewed companies prioritised the practical skills, knowledge and experiences of their employees for recruitment and promotion.

To tackle these skills problems and to meet labour market demand, as raised by companies, several major development plans from the government (IDP 2015–25, TVET Policy 2017–25, ESP 2019–23, and NSDP 2019–23) and other skills development projects by development partners (TVETSDP 2016–20, JICA TVET Project 2015–20, S4C 2019–23) have been introduced in Cambodia. For example, the "Skills for Competitiveness" project 2019–23 aims to develop a skilled workforce in four prioritised sectors, namely manufacturing, construction, electricity, and electronics (ADB 2019). The project is being implemented with selected leading TVET institutes, while strengthening industry's role and engagement in skills development, with a focus on upskilling and reskilling existing workers. Through building a school-industry linkage, industry and TVET schools are expected to promote work-based learning programs. This project also introduces a return-to-industry program to those TVET institutes, aimed at improving the current skills and competencies of instructors in training students to meet changing technological and industrial needs. This project is one exemplar of several attempts and efforts that the government and development partners have made to address skills development issues in the Cambodian labour market.

### 7.2 Transformation and its implications for skills

Several major changes in technology, products and work organisation were reported in some companies, while many companies reported small changes in production. These changes were driven by internal and external factors. The driving factors included market factors, product quality and quantity enhancement, skills and knowledge improvement, and labour and cost reduction, while market competition in terms of costs and prices was fierce among many companies. With those changes, workers' skills and knowledge also changed or were affected. Noticeably, changes in technology, products and work organisation had reciprocal and interdependent relationships. For example, most respondents reported that their companies were making new products with major changes in size or appearance, which led changes in production machines. The demand for higher product quality and quantity also resulted in the introduction of new or advanced machines as required by production, while worker wages increased. New work arrangements in production and work processes

were also established to match the desired goals and demands, as well as to reduce labour and production costs as much as possible.

As the literature shows, human capital is key to industrial productivity growth and to the success of firms (Benson, Gospel and Zhu 2013; Becker 1994; Schultz 1960; Mincer 1974). Transformation within the interviewed companies was believed to be intertwined with the skills, knowledge and experiences of the existing employees. The linkage between that transformation and the skills and qualifications were illustrated by companies, but not many companies explicitly stressed the importance of their employees' skills and qualifications as a main factor for consideration when introducing changes in technology, products, or work organisation. Here, the actual transformation types required at least a certain level and type of skills and knowledge. A few E&E and food processing companies emphasised the contribution of their employees' skills and knowledge to company transformation, while the rest of the companies, particularly in the garment sector, did not consider the existing skills and knowledge for their company transformation. Most companies changed their production machines or processes because their machines were old and broken; new product types required new, advanced machines; and a reduction in labour and production expenditure was intended. Having high and mid-level employees with skills and qualifications was not a lead driver of transformation in many companies across all three sectors.

Actually, most changes were dependent on their company headquarters abroad, machine suppliers or buyers offering technical support to make all the change processes possible. This indicates that technicians, mechanics or engineers, and the existing skills and knowledge within the companies, were not the main determinants of technology upgrading or product changes. High and mid-level employees were merely recipients of the skills and knowledge transferred by the technicians and experts from outside, while general workers and operators were the followers of those high- and mid-level employees. This might be because the skills, knowledge and experience of the existing employees were lower than those of the technicians and experts from headquarters or machine suppliers, and it could also mean that those new machines or technologies required higher or different skills that are not available in the companies or the Cambodian labour market.

Improvement in the skills and knowledge of existing employees was actually related to the introduction of new technology, product types or work organisation as most of the changes in production were made to enhance product quality and quantity, leading to high work performance and productivity growth as a whole. Changes in technology, product types or work arrangements required a certain change in employees' skills and knowledge, simply meaning that all the employees involved in the change process had to adapt to those changes and gradually improve their skills and knowledge over time. However, only a few companies in the E&E, garment and food processing sectors clearly indicated improvement in their employees' skills and knowledge, and the employees learned new, additional skills or knowledge when they worked with their peers or operational processes. Moreover, those changes would not have been possible without positive change or improvement in the skills and knowledge of the employees.

When changes were introduced within the companies, the employees with certain skillsets and experiences were also affected physically or emotionally depending on the magnitude of the change, such as the reduction in labour and production costs, employees' increased skills and knowledge, increased workload and job responsibilities, and management change. When grappling with the changes, most companies in the garment sector initiated an incentive

platform or a reward system that was intriguingly motivational for all the garment operators and other employees. Such bonus schemes enhanced work performance, leading to productivity growth as well as employee upskilling and reskilling in many companies, especially but not only in the garment sector.

### 7.3 Strategies for overcoming skills challenges and problems

When transformation occurred within companies, it seemingly posed certain problems and challenges related to employees' skills and knowledge. To deal with those skills problems and challenges, most companies had or used different strategies or methods including the outsourcing of technicians and experts from headquarters or machine suppliers; recruitment of new employees with new, additional skillsets; internal promotion of current employees with better skills and knowledge; and internal skills training and development (Lepak and Snell 1999). Among these methods, the outsourcing of outside technicians and experts was relatively high among many companies when transformation occurred. Most companies highly relied on their overseas branches, machine suppliers or buyers, while their internal technicians, mechanics or engineers were used only after the introduction of those changes. Skills and knowledge transferred by outside technicians and experts were also important to high- and mid-level employees such as managers, supervisors and leaders, who in turn shared what they had learned with their subordinates.

Skills outsourcing was also a means to avoid any recruitment of new employees or requirements for new, additional skillsets. The recruitment of new employees with specific skills and qualifications could be difficult and costly, explaining why most interviewed companies did not recruit any new employees with the required skillsets and qualifications. Instead, most companies promoted employees of different occupational levels based on work performance, practical skills and work experience. Internal promotion of current employees with work performance credentials was widely used in all the sectors, and especially in the garment sector. This was based on the fact that they trusted their employees' skills and experiences, and done in the knowledge that any initial disruptions would be resolved over time.

To improve employees' skills and knowledge, internal skills training and development was widely employed in all three sectors, while the uptake of formal skills training was minimal and only happened in some large companies, for instance, in the E&E sector, as indicated by previous studies (OECD 2013; Rainbird 2000; Selesnick 1981). As many companies reported, when transformation occurred, the key persons in the first round of skills and knowledge transfer or training from outside technicians and experts were high and mid-level employees including managers, supervisors and leaders who had strong foundational skills, knowledge and experience in production, and who had been with the companies for a long time. These principal employees then transferred the skills and knowledge they had learned to lower-level employees (operators and general workers) through peer learning, on-the-job training, work guidance, observation and practice. This skills transfer mechanism was seen as the only viable method for employee reskilling and upskilling in most companies.

Outsourcing of expertise and internal training could allow companies to enjoy advantages: reducing skills training costs, balancing internal labour-work needs, and meeting production skills requirements. That companies could deal with their skills needs and requirements internally reflects their low involvement and participation in the formal education and training sector. The adoption of this practice could also exacerbate existing school-industry linkages, putting companies and TVET providers in an arm's-length relationship. This finding illustrates that the internal skills training mechanism is reliable, practical and manageable at the company

level, while sending employees out to participate in skills training programs offered by local TVET providers could be burdensome, less relevant and costly at large. Therefore, the strategies that companies use best answer their skills needs and production requirements.

## 8. Conclusion

The skills, knowledge and competencies of the workforce are key to Cambodia's industrial development in order to upgrade the country's status to an upper-middle-income country by 2030 and a high-income country by 2050. Thus, this paper intended to explore the linkages between skills and industrial transformation, based on employers' perceptions of skills and qualifications in relation to job requirements, the relationship between skills and transformation, and human resource strategies to cope with the skills requirements posed by transformation, so informing a holistic skills development intervention that is responsive and relevant to the Cambodian labour market.

In this study, most companies reported that they experienced skills shortages and difficulties in recruiting high and mid-level employees. Companies also pointed to the low quality and level of education and training among workers. Most companies agreed that having more employees with better education and training could help introduce new products, adapt to technological change and reorganise work systems. Seeing a problem in the education and training system, most companies prioritised practical skills, knowledge and experience for recruitment or promotion, while they adopted their in-house training as a main tool for upskilling and reskilling their employees.

Transformation happened to some extent in most companies, driven by different factors such as market factors, increased product quality and quantity, skills and knowledge improvement, and labour and costs reduction. Most importantly, the transformation in most companies depended on their parent companies abroad, machine suppliers or main buyers for technical support and expertise, due to the lack of high skills and knowledge in their companies or the Cambodian labour market. The changes in technology, product types or work arrangements required a certain change in employees' skills and knowledge. The existing employees were also affected physically or emotionally depending on the magnitude of the changes.

Companies used different strategies including outsourcing of technicians and experts, recruitment of new employees, internal promotion, and internal skills training and development, in order to cope with transformation requirements. Outsourcing of technicians and experts was commonly found among many companies. Recruiting new employees with right skills could be difficult and costly, so most companies look for work performance, practical skills and work experience. Internal promotion was widely used, especially in the garment sector. In-house training was employed in all the sectors, while formal training was small and only happened in some large companies, for instance, in the E&E sector. High and mid-level employees including managers, supervisors and some experienced team leaders transferred their learned skills and knowledge to operators and general workers through peer learning, on-the-job training, work guidance, observation and practice.

## 9. Implications for policy consideration

Based solely on a one-sided analysis of employers' perspectives on and experiences in skills and transformation within companies, this study does not consider all the factors which have an impact on Cambodia's workforce skills development, and it is still subject to further exploration and discussion in the future. However, based on the findings and with the aim to

enhance vocational skills development in Cambodia, the study proposes the following policy implications on three aspects: 1) Promoting school-industry linkages, 2) Increasing employment opportunities, and 3) Amplifying investments in generic and specific training.

*1. Promoting school-industry linkages and ensuring mutual benefits*

Skills shortages, irrelevance and gaps were generally experienced by most interviewed companies, reflecting that employers are not satisfied with the skills and qualifications of the current workforce. Therefore, making TVET curriculum relevant and matching skills provision to industrial skills needs requires that government agencies, TVET providers and representatives from the private sector work together. Indeed, one way to enhance curriculum relevance is to promote an industry linkage with the private sector. Thus, building public-private partnerships between TVET schools and specific industrial sectors could bridge the gap between skills training programs and industrial skills requirements, while ensuring mutual benefits.

One example of university-industry linkage from an advanced economy is the Massachusetts Institute of Technology (MIT) in the United States. MIT used a triple collaboration of university, industry and government to develop its academic programs to shape competencies in fundamental issues and to build competence in translating economic ideas into real products (Bolgova, Grodskaya and Kurnikova 2020). A local linkage model is the Kirirom Institute of Technology (KIT). KIT provides the best software engineering programs, allowing students to experience real-life work and projects with technology companies, exemplifying university-industry collaboration. The sustainability of these industry linkages or collaborations between companies and TVET schools is dependent on cooperation and openness for mutual benefit, learning and understanding, wherein which each partner must state their expectations clearly and take full responsibility for realising them. Moreover, the role of the government should be to initiate, coordinate and finance collaborations between TVET and industries to meet industrial skills demands.

As stated in Cambodia's TVET policy (RGC 2017), one goal is to improve TVET quality to meet national and international labour market demands through strengthening the quality and performance of trainers, improving pedagogical content and practice, and ensuring that training infrastructure can meet changing technology needs. Establishing more TVET parks in industrial and special economic zones (SEZs) would maximise the use of training facilities and company trainers through school-industry cooperation. At the same time, improving and expanding existing TVET park activities and services would reach out to more companies and other beneficiaries. In this way, cutting-edge technologies and skills training facilities could be shared among companies and TVET schools. These shared training centres located in or near SEZs would also allow for cost sharing of generic skills training programs such as soft skills development, workplace safety, and industrial labour laws and regulations. However, building a common understanding between TVET parks/training centres and companies about the training activities and services available for companies would need constant and clear communication and information exchange on the ground.

*2. Increasing possibilities of employment opportunities*

Most companies relied on external technicians or experts from headquarters or buyers when transformation occurred, illustrating the low skills and competence of the current workers. They doubted the quality of the skills and qualifications of graduates, and were therefore less likely to hire new graduates. This is a serious problem that should be addressed through improving

the relevance of TVET programs and more importantly through increasing employment opportunities for students in the forms of internship, apprenticeship and probation.

In line with the industry linkage, companies should open more internship programs giving senior students opportunities to gain and learn from real-world work experience. Open internship is a method that allows companies to observe students working as interns and to judge whether they have potential to be employees. Apprenticeship is a form of practical training which can be offered in the workplace. It is a form of work-based learning through which students can learn to solve real-work problems. The government needs to coordinate such an apprenticeship scheme or institutionalise it as mandatory training for new labour market entrants and students. In particular, the current short-term apprenticeship program introduced in the garment sector by MoLVT should be enhanced or reinforced and expanded to other sectors. In Germany, Switzerland, Austria, Hungary and South Korea, for instance, apprenticeships are a popular form of training, allowing students to learn practical skills in the workplace while participating in theoretical training at school. This joint apprenticeship training is a win-win contract between schools, students and companies, ensuring students are equipped with the skills, knowledge and competence necessary for the labour market. However, Cambodia may need to seriously study and pilot these models before integrating them into the current education and training system.

Furthermore, companies should recruit more employees with TVET skills and qualifications on a probation basis, thereby allowing a specific time period for new recruits to learn and adapt to the workplace. Although TVET graduates may not have all the necessary industry-specific skills, they at least have basic skills and knowledge upon which further skills and competencies could be built, so all transformation types could go smoothly, and companies could reduce partially their dependence on overseas branches in the long run.

*3. Amplifying investments in generic and specific skills training*

Skills training leading to certification or qualification was found to be very low among all employees, especially operators and general workers, while in-house skills training was the only mechanism used for employee reskilling and upskilling in most companies. However, this skills transfer method is not enough for workers in general due to a lack of systematic and structured skills training, often led by supervisors and team leaders most of whom do not have any qualifications except for practical skills and informal learning.

Besides the large share of in-house training, companies can sometimes arrange a certain number of supervisors and team leaders to have generic and specific skills training, leading to certification or qualification. Generic training includes employability skills or such soft skills as problem-solving, teamwork, leadership, conflict mediation and anger management. In the future, companies should systematise their in-house training with appropriate and structured content and levels and provide workers equal opportunities for training. When training workers internally or externally, companies should record the names of participants and training courses, which could be used as a basis for further training or promotion or for potential buyer requirements.

Once companies have properly structured or systematised training, they could issue certificates of attendance or participation to workers. This would help workers move around or up their career ladder from one position/company to another. Companies could also work with relevant ministries such as MoLVT to offer training courses at TVET parks or training centres in SEZs. More importantly, MoLVT and its development partners need to develop a comprehensive

skills certification/recognition system, allowing workers from industries to have their prior learning assessed and legitimised. MoLVT also needs to incentivise companies to organise more practical skills training in cooperation with TVET schools, as implemented in the SDP project by Swisscontact (2018). One effective way to motivate employees to actively participate in skills training is to give them incentives or scholarships, as many companies have already introduced a reward system to enhance worker productivity. An incentive or reward system should be not only a motivational tool that could enhance work performance but also a stimulus to enhance workers' skills through reskilling and upskilling programs for employees of all occupational levels. This reward system consists of financial and non-financial incentives including bonuses, certificates of high-performance achievement, annual leave, annual trips, special skills training programs, and other forms of motivation. This system should aim to retain and promote employees to a certain level of management, while reducing unintended employee turnover rates and recruitment costs.

It is also important to focus on equipping the existing and future workforce with basic technological skills and competencies in preparation for embracing the emerging fourth industrial revolution in Cambodia's manufacturing industry. This work could be done through close cooperation between companies and TVET schools in setting up and designing technological courses and other necessary courses for current and future technological requirements. The TVET sector also needs to develop and implement a holistic skills development roadmap to ensure that learners are well prepared for a fast-changing work landscape due to rapid advancements in the manufacturing sector.

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# Appendices

Appendix 1: Cambodia's national education and training system

<table>
<tr><td rowspan="2">Age</td><td rowspan="2">Grade</td><td>Stream</td><td>General Education</td><td>TVET</td><td>Higher Education</td><td>Non-Formal Education</td></tr>
<tr><td>Governance</td><td>Ministry of Education, Youth and Sport</td><td>Ministry of Labour and Vocational Training</td><td>Ministry of Education, Youth and Sport; other relevant Ministries</td><td>Ministry of Education, Youth and Sport; other relevant ministries</td></tr>
<tr><td>26</td><td rowspan="8"></td><td rowspan="3">CQF Level 8</td><td rowspan="3"></td><td rowspan="3">Doctoral degree</td><td rowspan="3">Doctoral degree</td><td rowspan="8"></td></tr>
<tr><td>25</td></tr>
<tr><td>24</td></tr>
<tr><td>23</td><td rowspan="2">CQF Level 7</td><td rowspan="2"></td><td rowspan="2">Master's degree (technology/business)</td><td rowspan="2">Master's degree</td></tr>
<tr><td>22</td></tr>
<tr><td>21</td><td rowspan="2">CQF Level 6</td><td rowspan="2"></td><td rowspan="2">Bachelor's degree (technology/business)</td><td rowspan="2">Bachelor's degree</td></tr>
<tr><td>20</td></tr>
<tr><td>19</td><td rowspan="2">CQF Level 5</td><td rowspan="2"></td><td rowspan="2">Higher diploma (technology/business)</td><td rowspan="2">Association degree</td></tr>
<tr><td>18</td></tr>
<tr><td>17</td><td>Grade 12</td><td>CQF Level 4</td><td rowspan="3">Upper Secondary Education</td><td>TVET Certificate 3</td><td rowspan="12"></td><td rowspan="12"></td></tr>
<tr><td>16</td><td>Grade 11</td><td>CQF Level 3</td><td>TVET Certificate 2</td></tr>
<tr><td>15</td><td>Grade 10</td><td>CQF Level 2</td><td>TVET Certificate 1</td></tr>
<tr><td>14</td><td>Grade 9</td><td rowspan="3">CQF Level 1</td><td rowspan="3">Lower Secondary Education</td><td rowspan="3">Vocational Certificates</td></tr>
<tr><td>13</td><td>Grade 8</td></tr>
<tr><td>12</td><td>Grade 7</td></tr>
<tr><td>11</td><td>Grade 6</td><td colspan="3" rowspan="6">Primary Education</td></tr>
<tr><td>10</td><td>Grade 5</td></tr>
<tr><td>9</td><td>Grade 4</td></tr>
<tr><td>8</td><td>Grade 3</td></tr>
<tr><td>7</td><td>Grade 2</td></tr>
<tr><td>6</td><td>Grade 1</td></tr>
<tr><td>5</td><td>High Step</td><td colspan="2" rowspan="3">Preschool Education</td></tr>
<tr><td>4</td><td>Medium Step</td></tr>
<tr><td>3</td><td>Low Step</td></tr>
</table>

Note: CQF = Cambodian Qualifications Framework.

Source: Adapted from SEAMEO (2017, 37); ADB (2016b, 3)

Appendix 2: Enrolments at MoLVT-registered TVET institutions, 2009/10 to 2018/19

| Type | Level | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Public** | Postgraduate degree | 57 | 138 | 47 | 106 | 49 | 25 | 52 | 73 | 27 | 195 |
| | Bachelor's degree | 4,733 | 6,561 | 9,047 | 10,559 | 10,152 | 7,605 | 15,116 | 16,540 | 8,791 | 18,045 |
| | Higher diploma | 2,930 | 2,923 | 3,656 | 4,174 | 2,978 | 3,738 | 6,888 | 8,503 | 5,638 | 8,859 |
| | TVET certificate | 898 | 1,298 | 1,159 | 1,308 | 1,374 | 1,259 | 1,990 | 2,674 | 3,215 | 3,700 |
| | Short course | 39,624 | 64,074 | 107,928 | 104,829 | 65,053 | 16,912 | 12,074 | 11,417 | 27,135 | 38,368 |
| **Private** | Postgraduate degree | NA | NA | NA | NA | NA | NA | NA | NA | NA | 333 |
| | Bachelor's degree | 1,023 | 2,451 | 5,594 | 7,003 | 11,676 | 7,959 | NA | NA | NA | 4,108 |
| | Higher technical diploma | 1,102 | 4,244 | 1,239 | 1,250 | 6,558 | 1,293 | NA | NA | NA | 2,895 |
| | TVET certificate | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1,117 |
| | Short course | 3,082 | 13,986 | 7,742 | 7,138 | 10,622 | 12,308 | NA | NA | NA | 7,320 |
| **NGO** | Postgraduate degree | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Bachelor's degree | NA | 110 | 42 | 194 | 314 | 46 | NA | NA | NA | NA |
| | Higher diploma | 1,102 | 1,293 | 843 | 1,232 | 1,202 | 732 | NA | NA | NA | NA |
| | TVET certificate | NA | 179 | 1,092 | 1,118 | 1,083 | 1,011 | NA | NA | NA | NA |
| | Short course | 609 | 2,711 | 1,450 | 1,056 | 1,756 | 5,940 | NA | NA | NA | NA |
| | **Total** | 55,160 | 99,968 | 139,839 | 139,967 | 112,817 | 58,828 | 36,120 | 39,207 | 44,806 | 84,940 |

Note: 2009–15 data taken from ADB's Strengthening Technical and Vocational Education and Training Project, 2015–19 data taken from MOLVT's Technical and Vocational Education and Training Statistics.

Source: ADB (2016a, 25); MoLVT (2017, 2019, 2020)

Appendix 3: Company characteristics

| No. | Firm ID | Sector | Location | Size | Year established | Nationality of ownership | Export product share (%) | Interview date |
|---|---|---|---|---|---|---|---|---|
| 1 | CE4771 | E&E | Phnom Penh | Lge | 2011 | Japanese | >66 | 16-10-2019 |
| 2 | CEB043 | E&E | Phnom Penh | Med | 2014 | Japanese | >66 | 16-10-2019 |
| 3 | CE5913F | E&E | Banteay Meanchey | Lge | 2012 | Japanese | >66 | 14-11-2019 |
| 4 | CE518AD | E&E | Siem Reap | Med | 2016 | Chinese | >66 | 25-10-2019 |
| 5 | CE1BD4F | E&E | Phnom Penh | Med | 2012 | Japanese | >66 | 26-11-2019 |
| 6 | CE166E20 | E&E | Banteay Meanchey | Med | 2017 | Japanese | >66 | 14-11-2019 |
| 7 | CF3 | FP | Phnom Penh | Med | 2014 | Chinese | 0 | 18-11-2019 |
| 8 | CF248C | FP | Phnom Penh | Sm | 2016 | Japanese | >66 | 17-11-2019 |
| 9 | CFC0BB6 | FP | Phnom Penh | Med | 2015 | North American | 0 | 22-10-2019 |
| 10 | CFE45EE | FP | Phnom Penh | Lge | 2002 | Cambodian | <33 | 31-12-2019 |
| 11 | CF10395 | FP | Phnom Penh | Lge | 2009 | North American | >66 | 26-12-2019 |
| 12 | CF125571 | FP | Phnom Penh | Lge | 2001 | Cambodian | 33–66 | 20-11-2019 |
| 13 | CGBC830 | G | Phnom Penh | Lge | 2016 | Chinese | >66 | 18-11-2019 |
| 14 | CG1099F | G | Sihanoukville | Lge | 2013 | Chinese | >66 | 05-11-2019 |
| 15 | CGBBEBC | G | Phnom Penh | Lge | 2012 | Chinese | >66 | 12-12-2019 |
| 16 | CGSZYY | G | Sihanoukville | Med | 2015 | Chinese | >66 | 05-11-2019 |
| 17 | CG16903 | G | Phnom Penh | Lge | 1997 | Chinese | >66 | 25-11-2019 |
| 18 | CGF21EF | G | Kandal | Lge | 2010 | Chinese | >66 | 26-11-2019 |

Note: E&E = electrical and electronic; FP = food processing; G = garment.

Source: Authors

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